B.E.P. CONVENTION NUMBER

ELECTRICAL TIMES

THURSDAY
22 JUNE
1950
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MAZDA

the outshining light

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Made in England by B T-H *Leaders in Lighting*

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THE BRITISH THOMSON-HOUSTON COMPANY LIMITED

I'm particular myself, Mrs. Williams—always have been. But there's limits. Now take all the testing they do here and never being contented with things as they are and always experimenting in laborarorities and looking at every bit of Crompton cable as if it was the Crown Jewels. That's not being just particular—it's being finicky. And the cable is only to put in the ground anyway.

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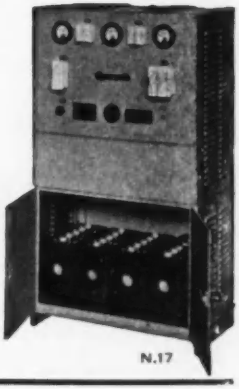
If the mains should fail, the **Nife-Neverfayle emergency lighting equipment** will instantly, automatically flash into action with complete reliability. That is the special advantage of the NIFE battery. For a NIFE battery will not deteriorate even during months of inactivity—its electrolyte is almost inert. A NIFE battery can stand up to rough handling and neglect—it is made principally of steel. And finally, a NIFE battery's first cost is almost its last cost—it needs practically no attention. Hospitals and cinemas all over the world have already installed Nife-Neverfayle emergency lighting equipment.



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with the STEEL battery

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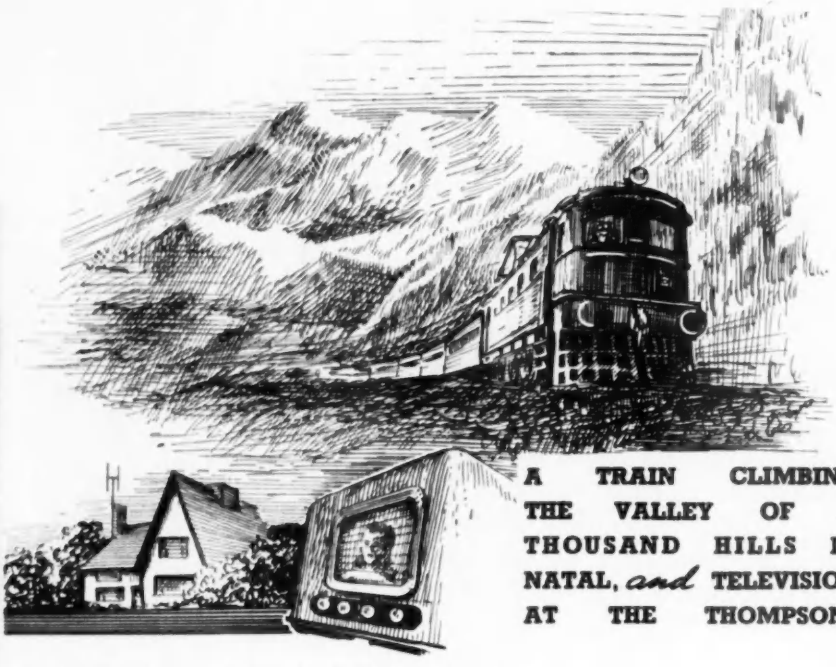

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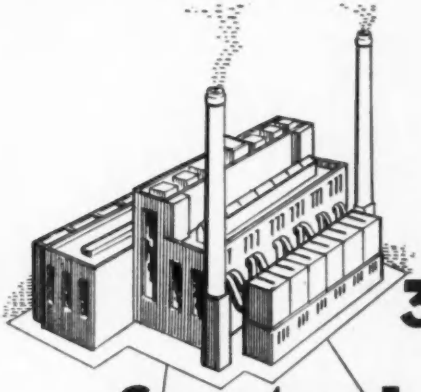
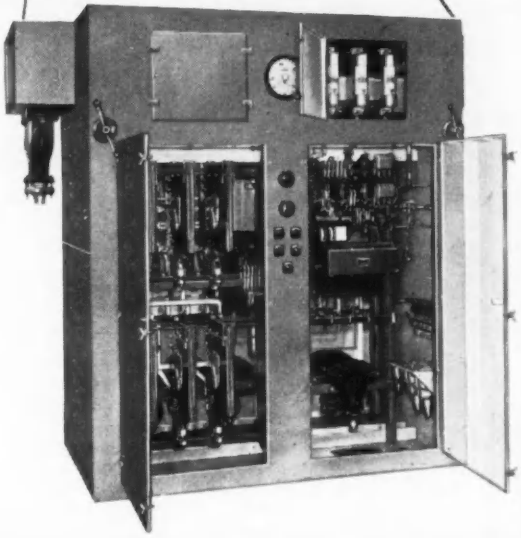


3.300 Volt Control Gear for Power Station Auxiliaries



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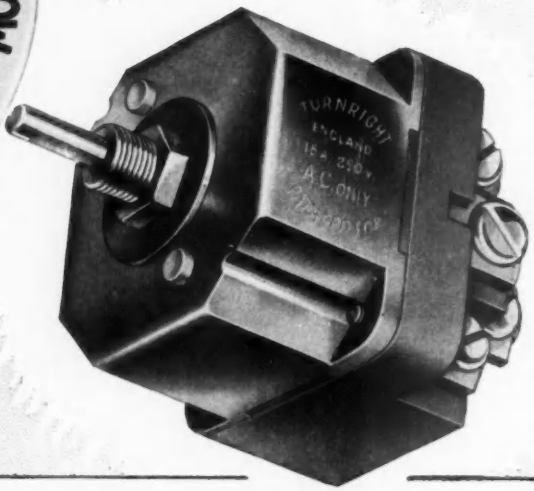

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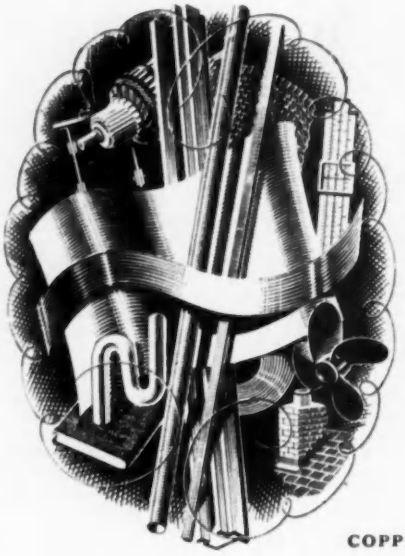

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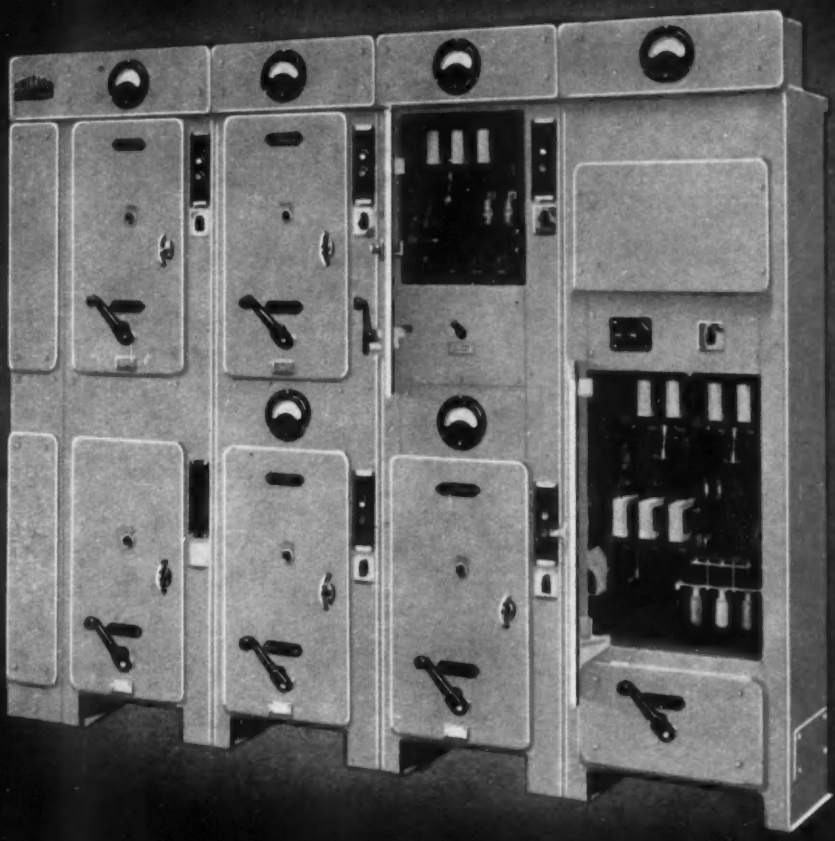

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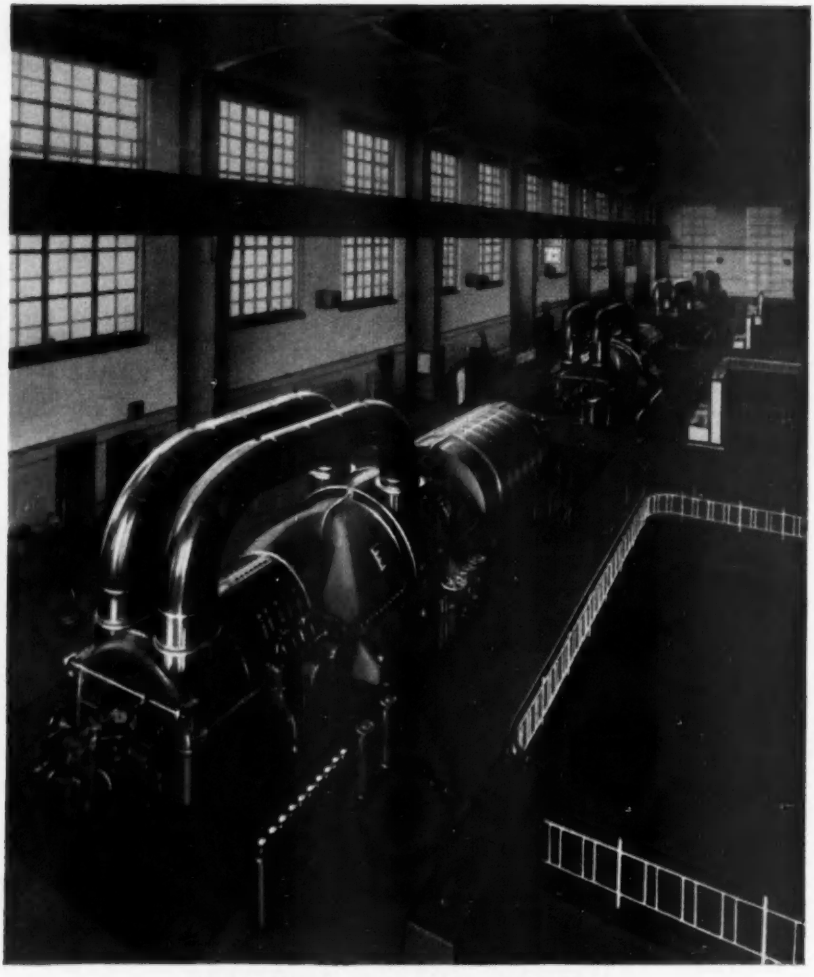

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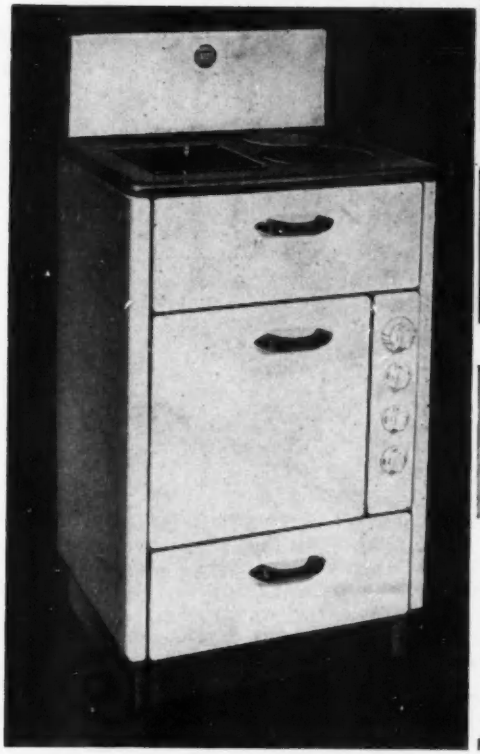
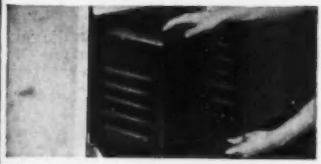
FIRST impressions are important—and this electric cooker delights the housewife at once with its good-to-look-at, easy-to-clean design. When she learns all the Falco can *do*, she is even more enthusiastic, for its self-controlled heat means the end to so much fuss and bother. The Falco has *every* virtue a modern electric cooker can possess:



This is the **Falco No. 16** with 3 cooking plates and a utility drawer at the bottom for cooking utensils . . . **Falco No. 15** is the same but has 2 cooking plates . . . **Falco No. 17** is the same but has 2 cooking plates and no utility drawer.

1 Self-indicating switch handles.

2 Quickly dismantled for cleaning.



3 Round-cornered, removable oven — unscrew a nut and out it comes bottom, sides and top for easy cleaning.
4 Clean-line design.
5 Cream, cream and green, white or light grey mottled vitreous-enamel finish.
6 Thermostatic oven control.
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8 E.D.A. interchangeability.
9 Fuses.
10 Plug-in oven elements.
11 Spring controlled drop-down oven door.
12 First class electrical and mechanical construction.

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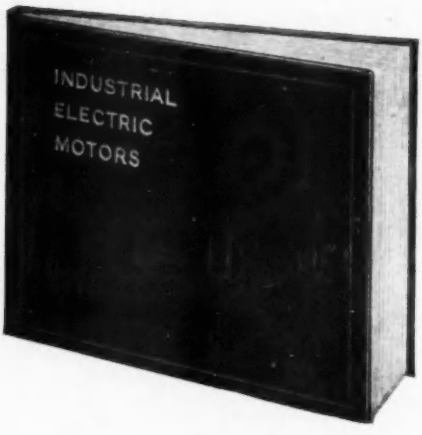

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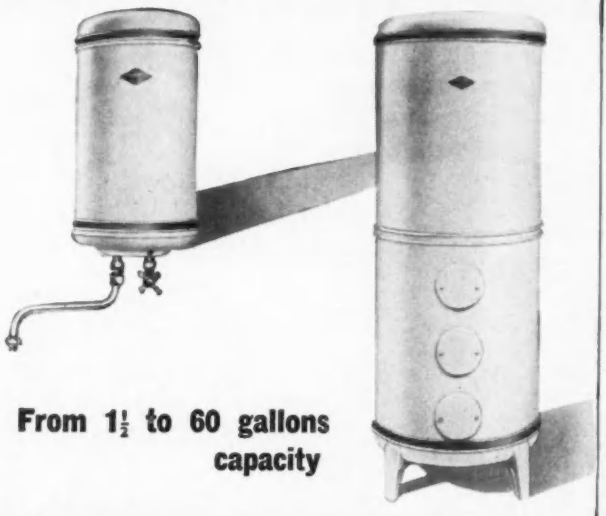
We SPECIALIZE in ELECTRIC WATER HEATERS



From 1½ to 60 gallons capacity

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For all types of tank

These are times of specialization. The "Jack-of-all-Trades" cannot hope to keep pace with the knowledge and experience that is constantly being amassed. In electric water heating the same holds good—the success of the SADIA is in great measure due to the fact that its makers have specialized. For over 25 years they have worked with one object in mind — the production of the most advanced water heating appliances that good design and manufacture can devise.

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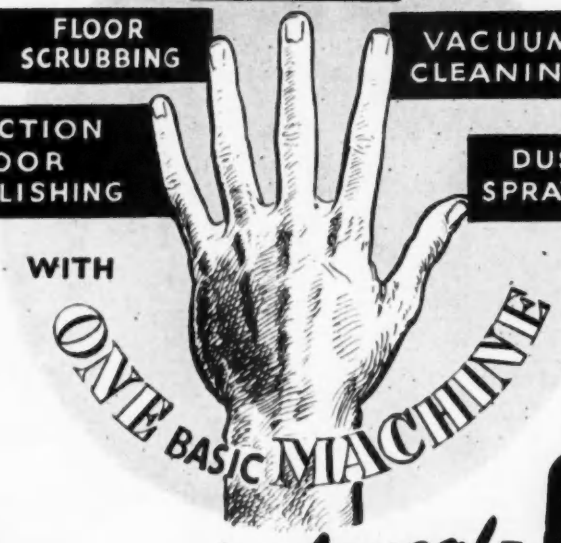

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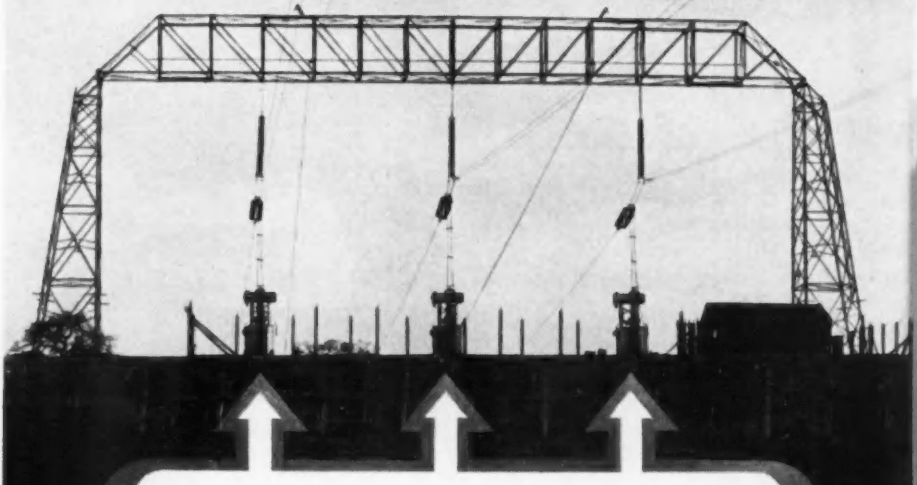

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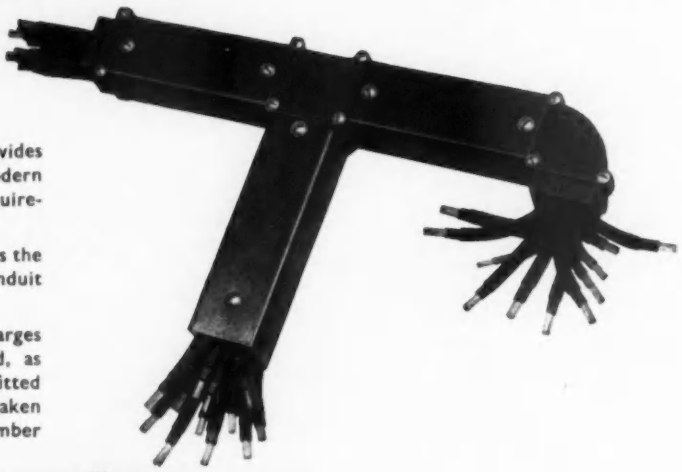

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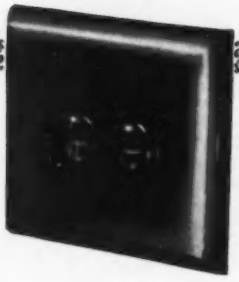

IN their resolve to make available for domestic installations a really *good* switch matching the greatly improved standards officially set for POST-WAR HOUSING, New Day faced the problem of eliminating the wear too frequently responsible for the premature failure of conventional designs.

They solved the problem by the use of BALL BEARINGS. The result is a switch with an infinite mechanical life ; an electrical performance and capacity for overload several times that called for in the relevant B.S.1299 ; a simplified form of fixing which halves labour costs ; and an unusually attractive appearance which reflects the meticulous care applied throughout the design of this exceptionally fine tumbler switch.

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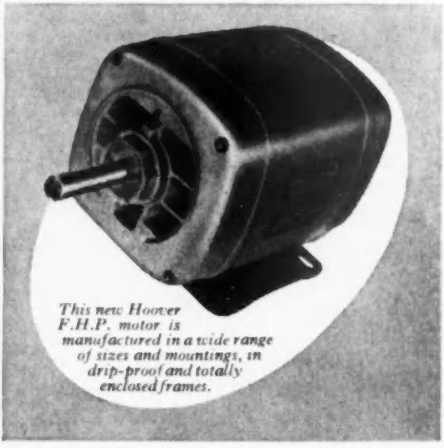
The marvellous new Hoover Electric Washing Machine does the full weekly wash for a large family, yet will stand under the average draining board. £25 (plus tax).



This new Hoover F.H.P. motor is manufactured in a wide range of sizes and mountings, in drip-proof and totally enclosed frames.

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The New Series 4 'MEGGER' EARTH & EARTHOMETER TESTERS

A smaller and cheaper series of Megger Earth Testers and Earthometer Testers, the Series 4, embraces features well-known in the company's larger instruments for determining the resistance to earth of earth electrodes, thus ascertaining if their resistance is sufficiently low to ensure correct operation of protective gear and to minimise lightning dangers. The Earthometer Tester will, in addition, measure the impedance of complete earthing circuits including electrode resistances at both sub-station and consumer's premises. **Write for Leaflet J051/25.**

There are also Series 4 Megger Insulation Testers. They are described in ***Leaflet J051/5 available on demand.***

- **TWIN SCALES** (0–40 and 0–200 ohms, or 0–100 and 0–500 ohms, as specified).
- **RANGE SELECTOR SWITCH**
- **FOUR TERMINAL INSTRUMENT** with special switches linking together pairs of terminals.
- **LIVE LINE DETECTOR** to protect Earthometer Tester.
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- **SMALL HANDY PLASTIC CASE** (Weight 6 lbs.)

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The side seams are soldered with Fryolux Solder Paint, and the neck and strap holders are soldered to the body with the same material.
The precision with which Fryolux can be applied is an important factor in saving time and material and increasing output.
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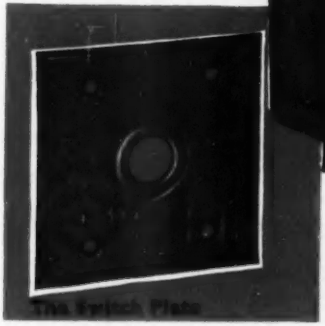
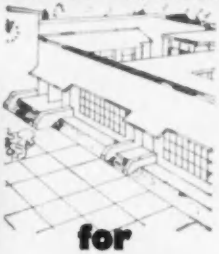
5 amp. & 15 amp. flush switch units

The Switch


The Switch Plate



for schools

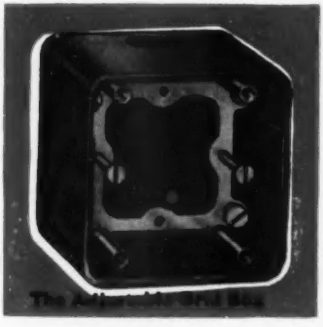
This flush switch unit is a worthy criterion of all BRITMAC products and is one of a large range of electrical accessories that has been supplied in quantity for schools, technical colleges, hospitals and other public buildings.

for hospitals

All BRITMAC ELECTRICAL ACCESSORIES are characterised by their strength, safety and efficiency over long periods and Installation Engineers who specify BRITMAC products by name are certain of the highest standard of quality, perfection of finish, coupled with a prompt and personal service.

The Switch: This is the well-known 'Silomac' for use on a.c. current only and, as the name implies, is silent in operation.

The Switch Plate: Incorporates the cuttered-hole and four corner screws, dispensing with the need for a switch ring. For added safety, corner screws of a 'secret' pattern can be supplied.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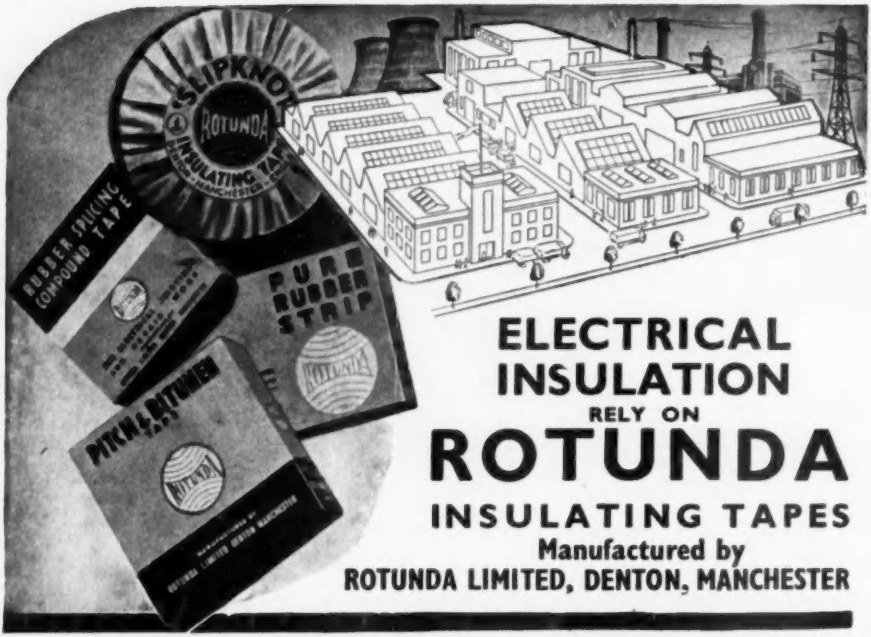
Glasgow Offices: 247a ST. VINCENT ST. & 93 DOUGLAS ST., GLASGOW, C.2. Tel.: CENTRAL 3445/6



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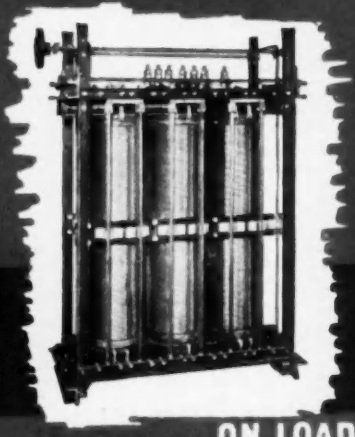

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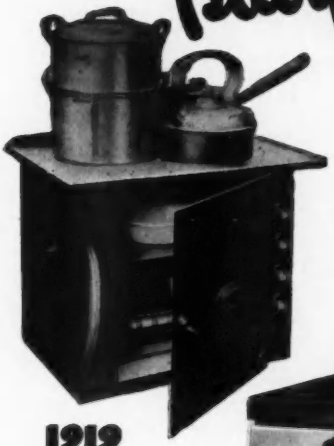
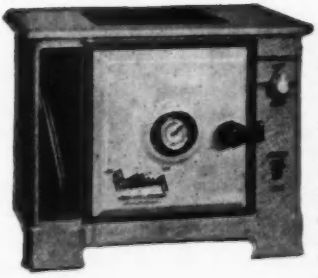
Baby Belling COOKER



1919

1929

1950



1935

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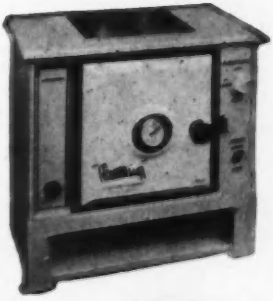

1937

BELLING & COMPANY LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX

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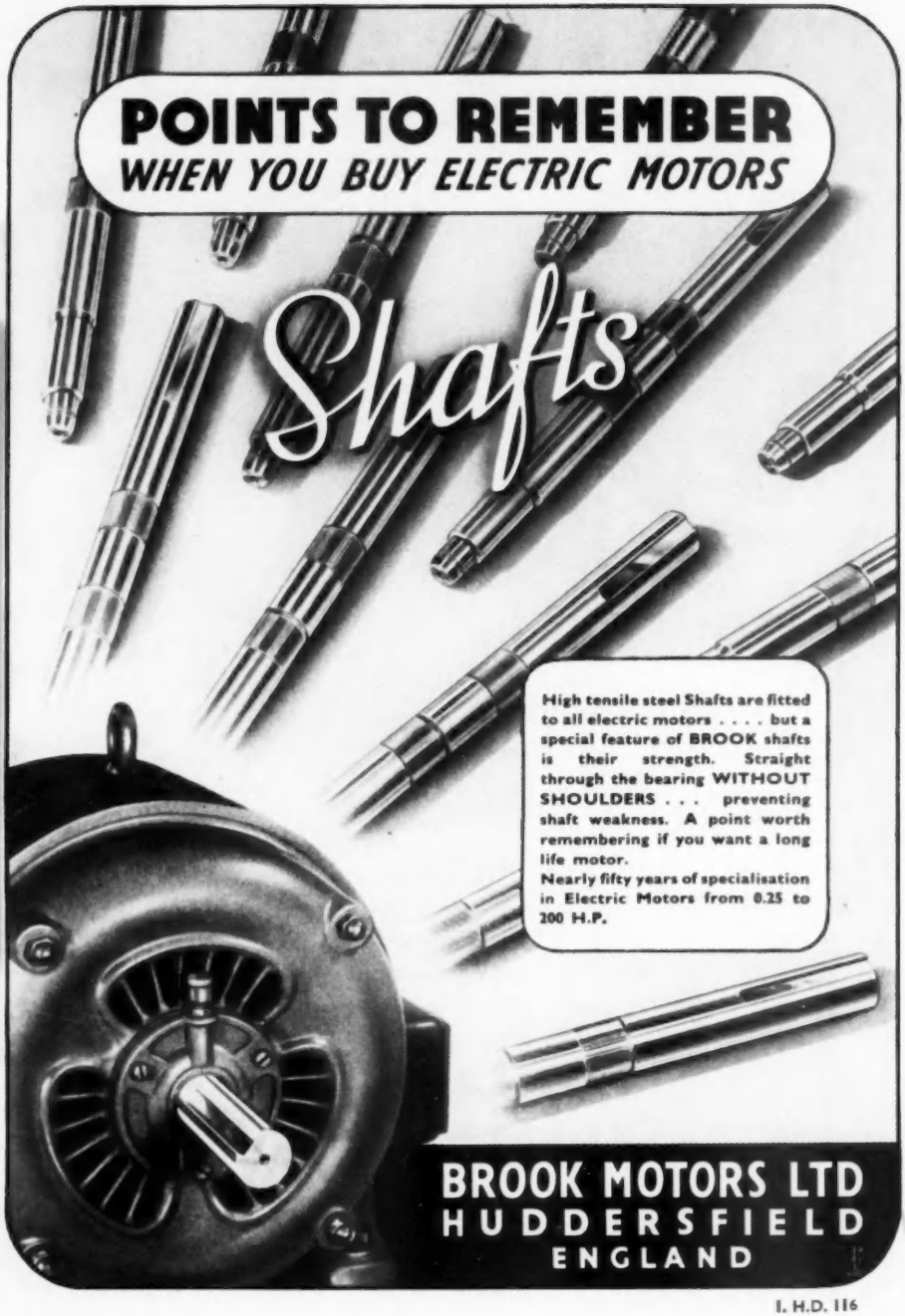
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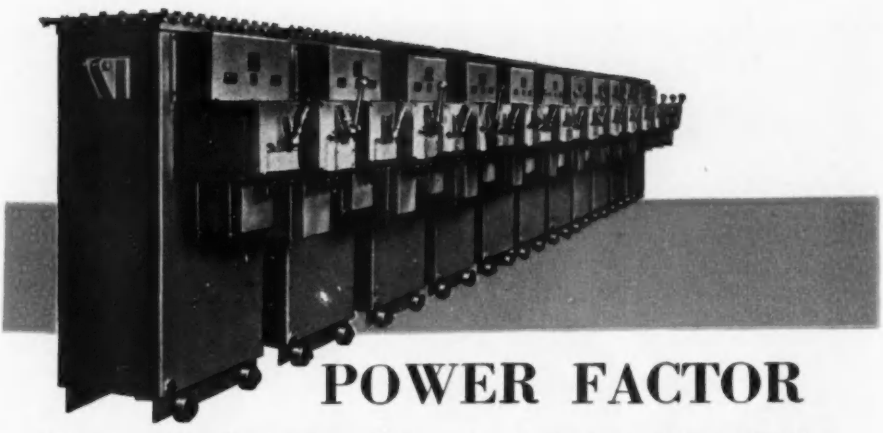

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Cost of Power

	£	s.	d.
Before installing Capacitor	4,901	5	0
After installing Capacitor	4,421	5	0
Saving per annum	**480**	**0**	**0**

Approximate cost of Capacitor equipment was £450, thus paying for itself in much less than a year.

A large factory installed Dubilier Capacitors to correct their power factor from 0.78 to 0.95, thereby reducing their maximum demand from 445 KVA to 365 KVA.

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Approximate cost of Capacitor equipment £47 10 0 thus paying for itself in the first year.

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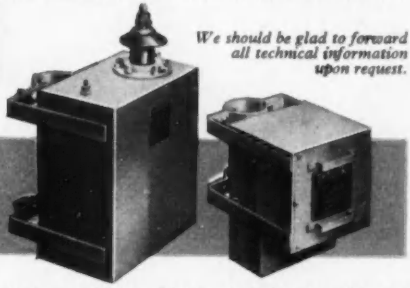

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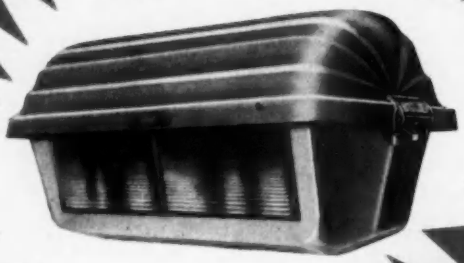

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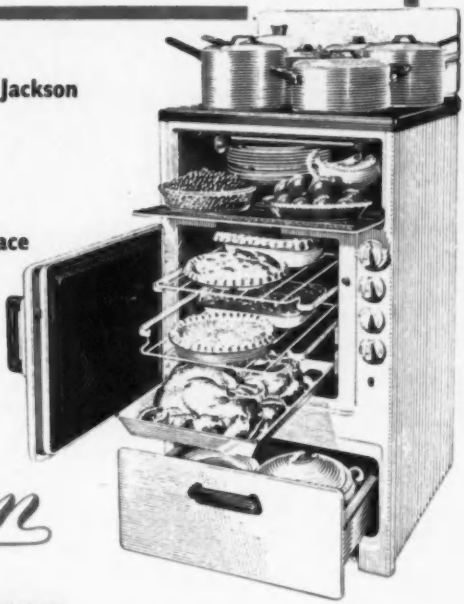

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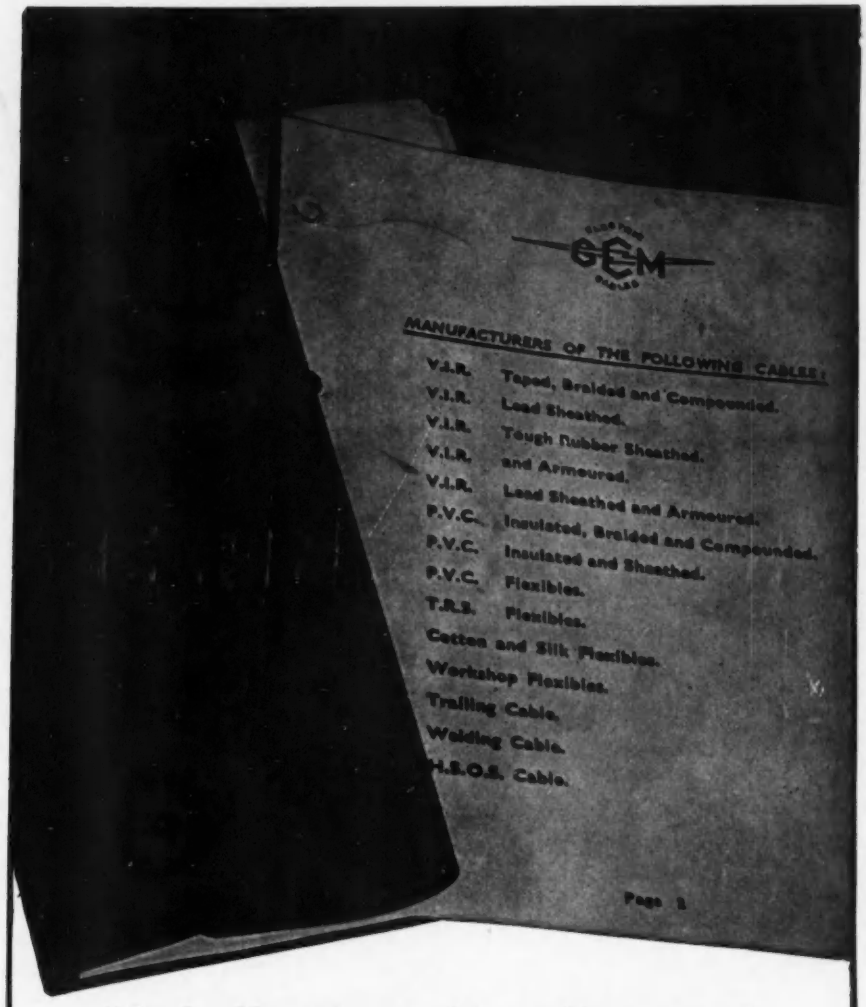

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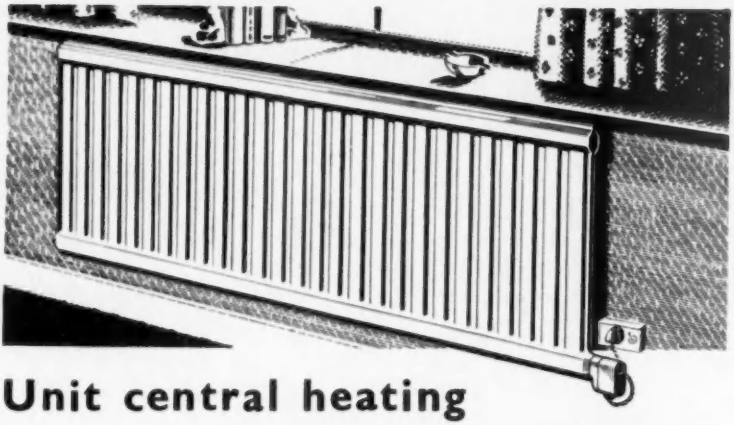

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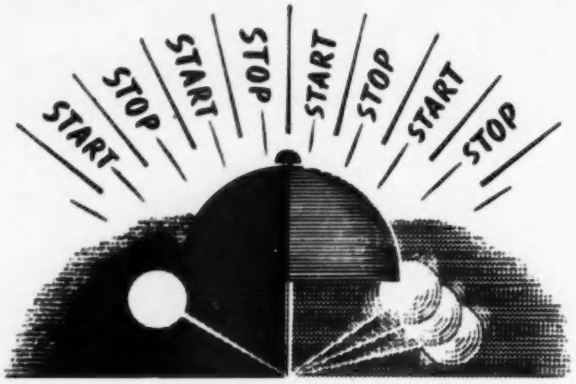

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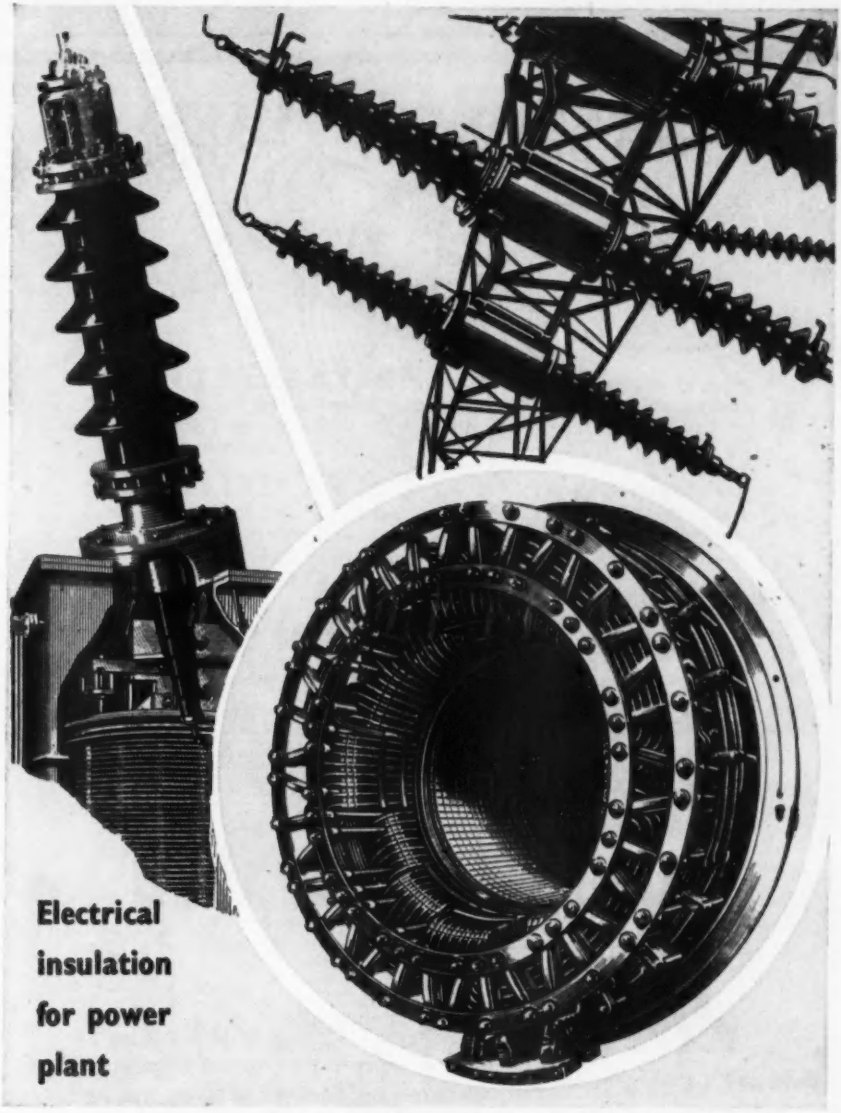

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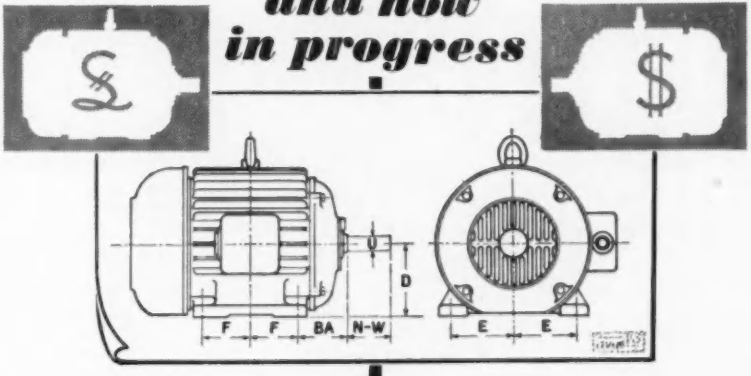

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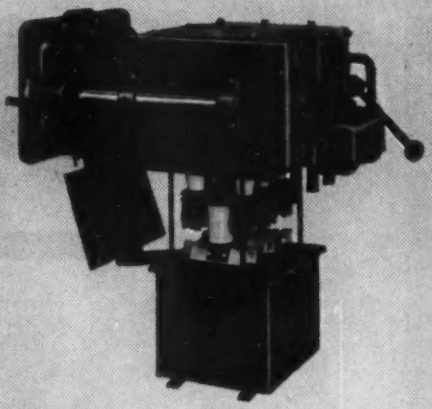

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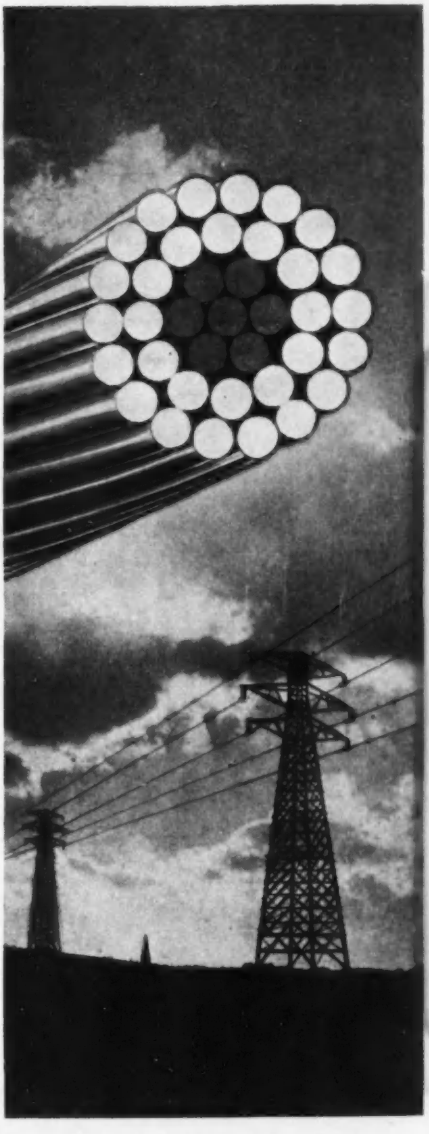

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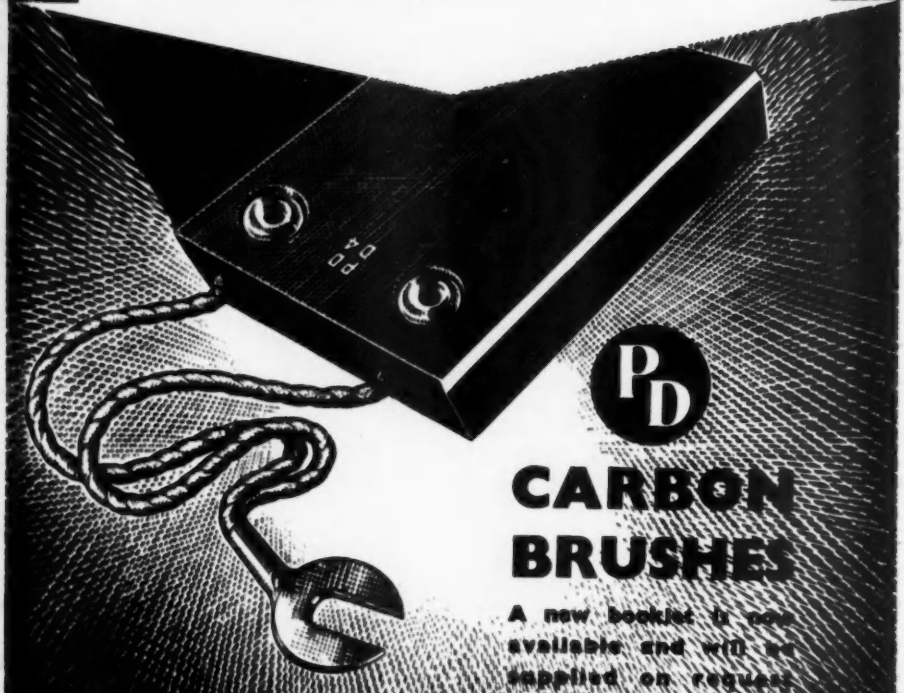

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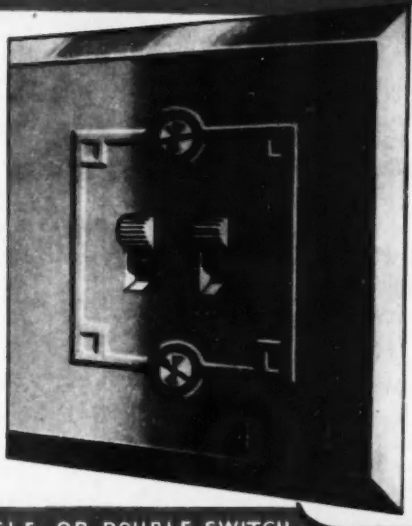

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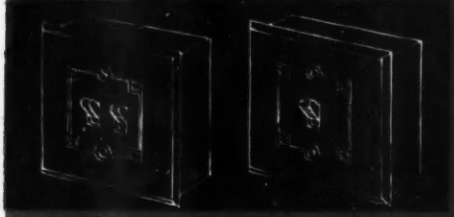

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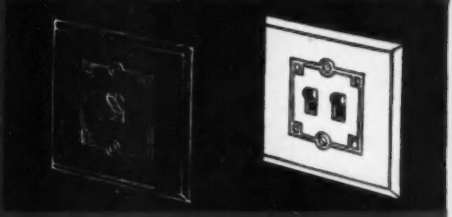

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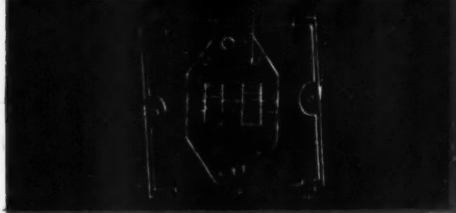

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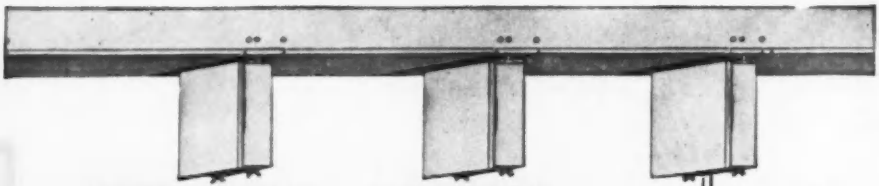

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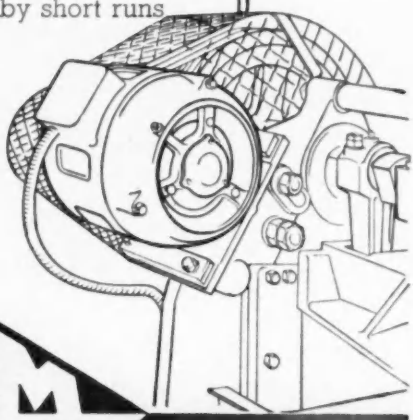

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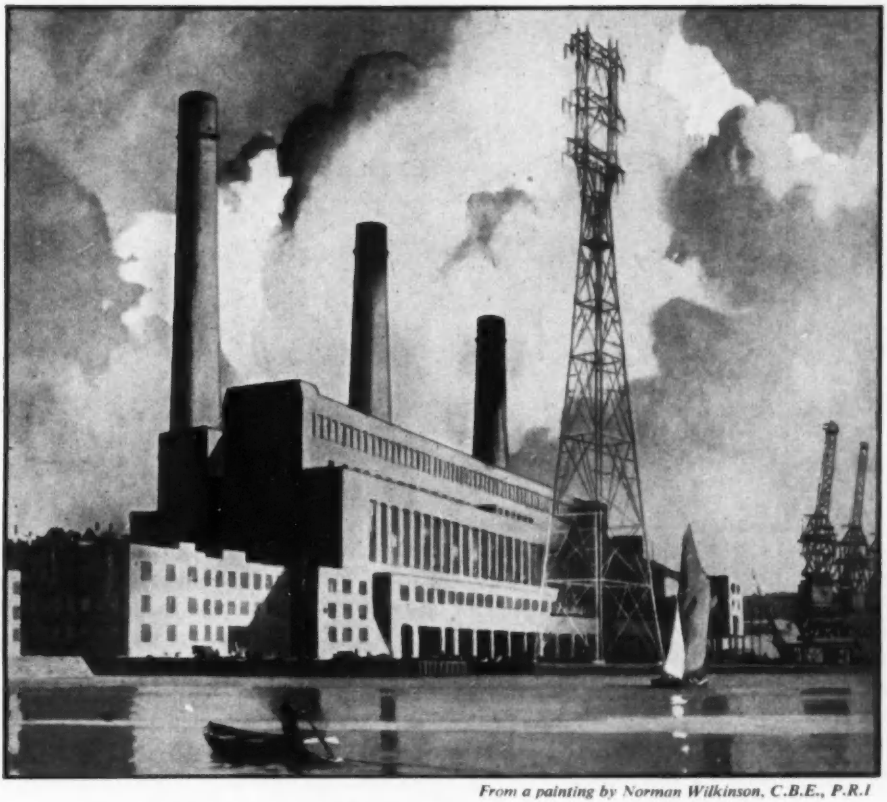

From a painting by Norman Wilkinson, C.B.E., P.R.I

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ALL OVER BRITAIN new power stations are taking shape. They are the finest that engineering brains and skill can produce. On the banks of the Orwell at Cliff Quay, Ipswich, is the third of these great post-war power plants to be brought into operation by British Electricity.

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Cliff Quay is already supplying much needed electricity. When completed it will house six 45,000 kW turbo-alternators and nine boilers rated at 365,000 lb of steam per hour at a pressure of 635 lb per sq in and a temperature of 850 deg. F. This fine station is only *one* of 38 being built by British Electricity and, in addition, 43 existing stations are being extended to give increased output. This is part of British Electricity's plan to overtake the power shortage and meet the ever increasing demand for electricity which has more than doubled in the last 10 years.

more power FROM IPSWICH **means more power to the nation**

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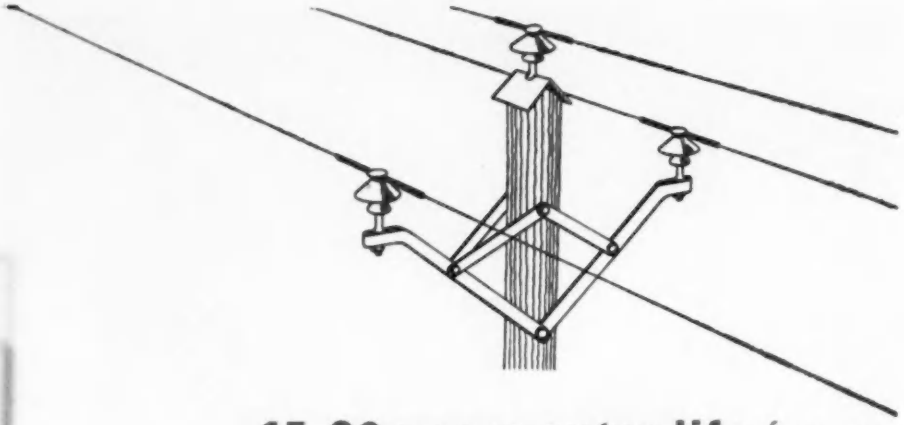

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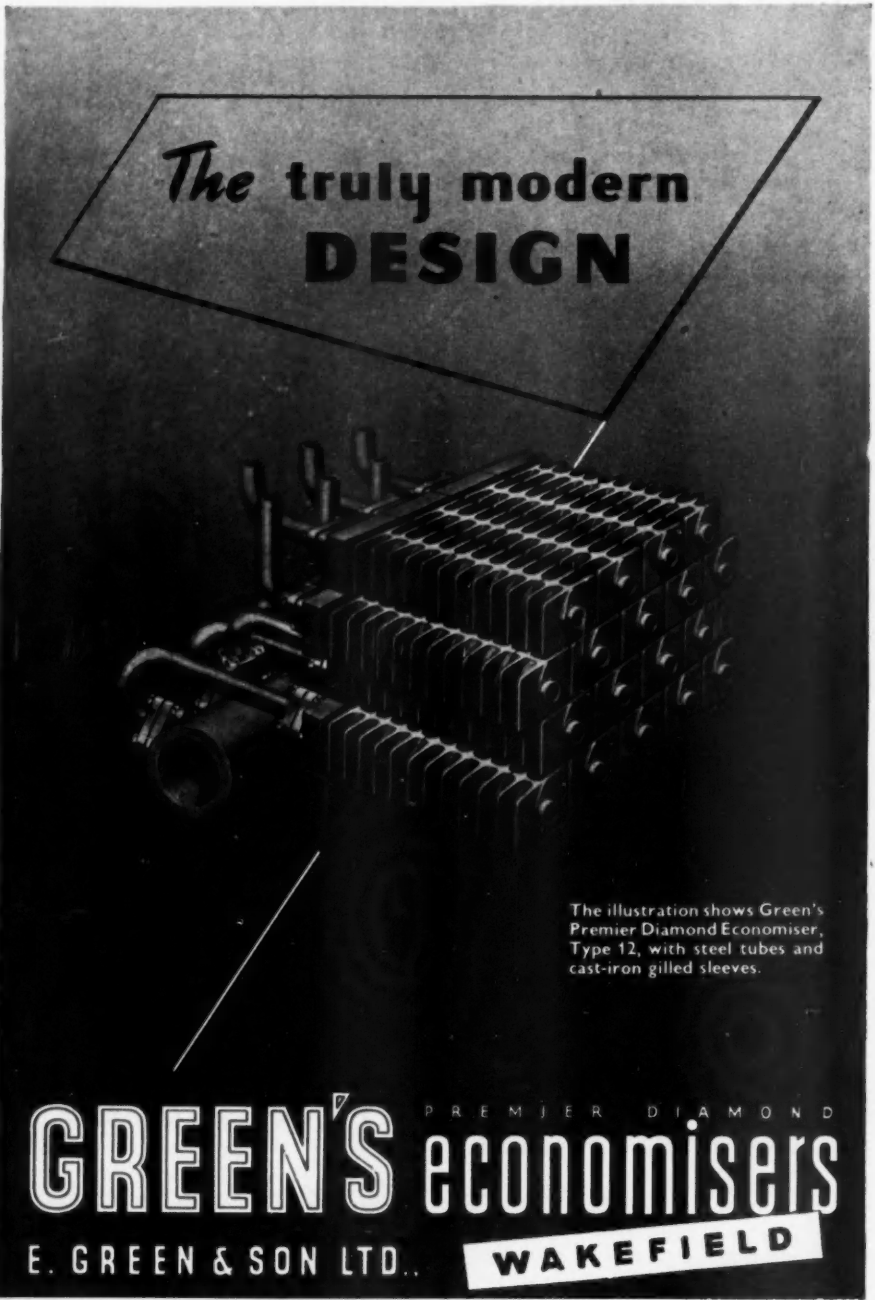
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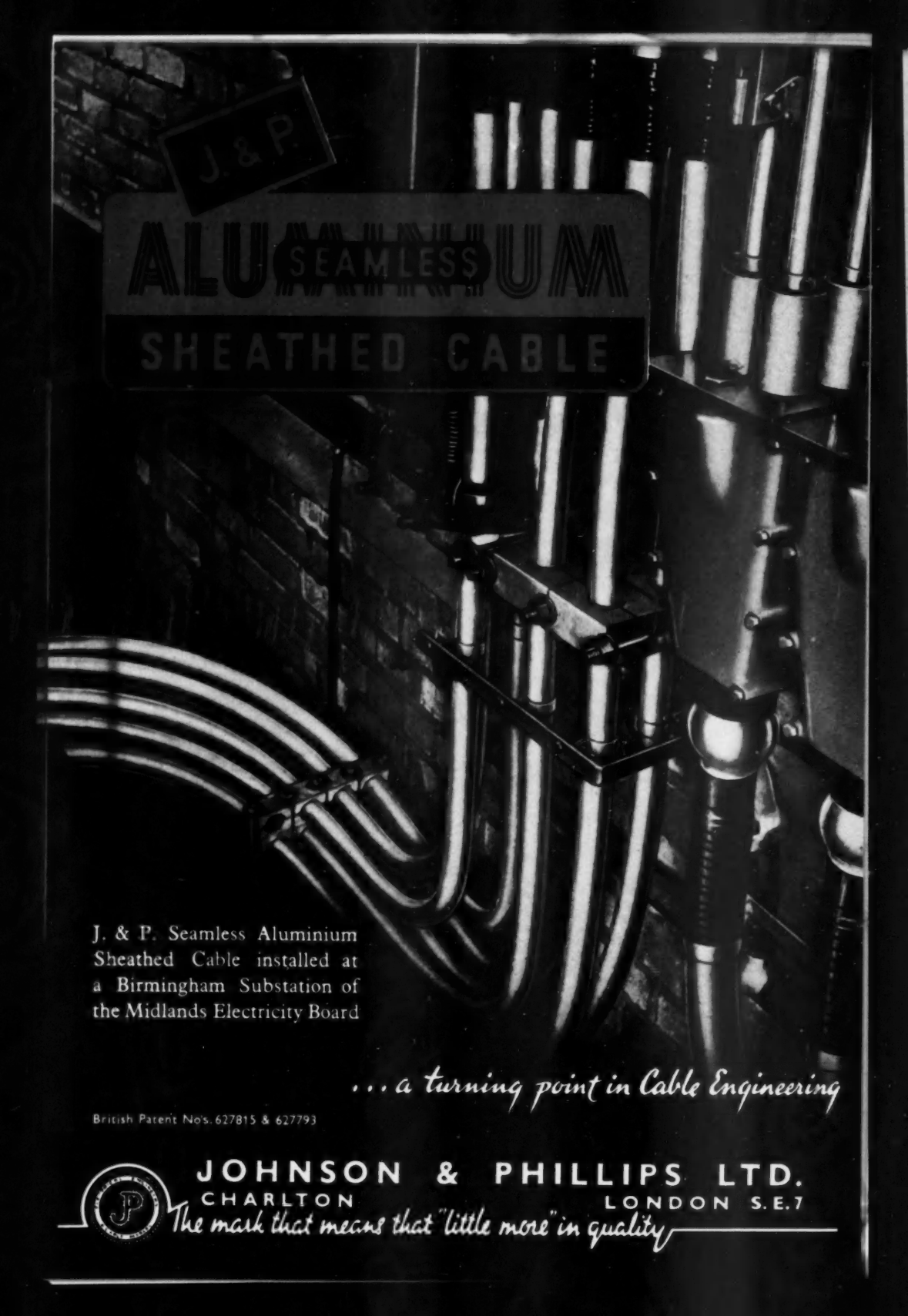

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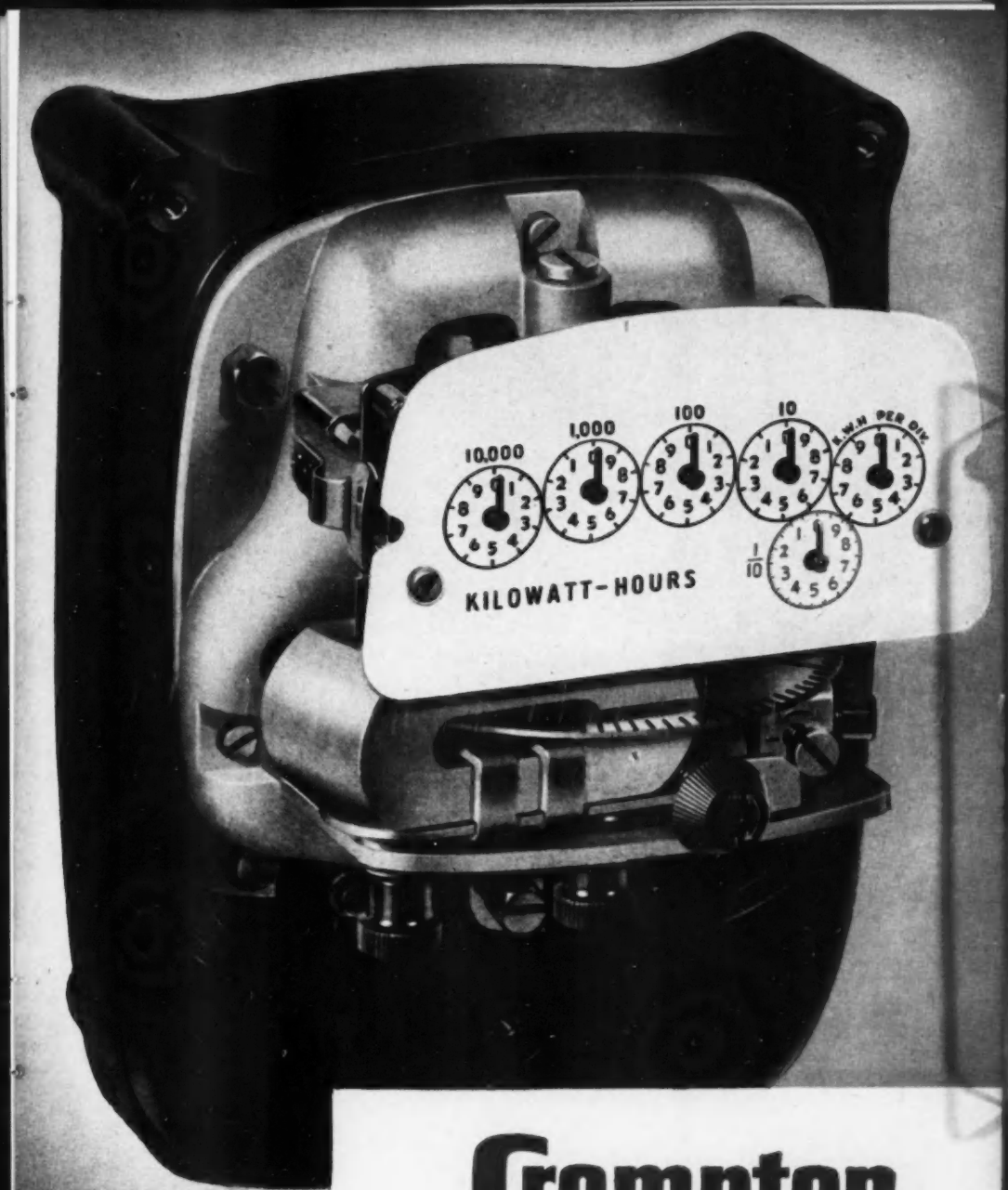

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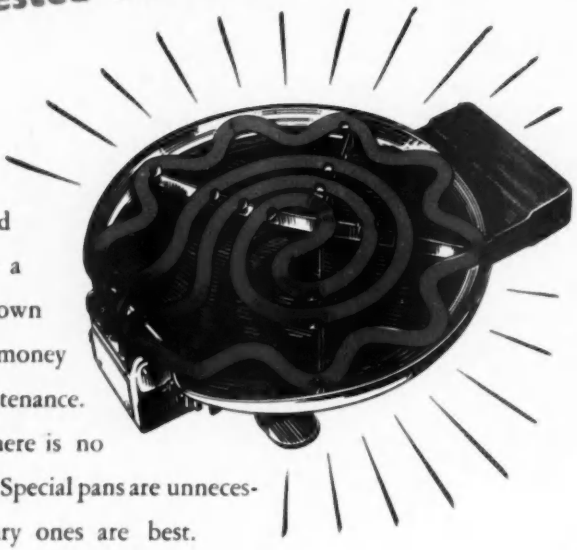

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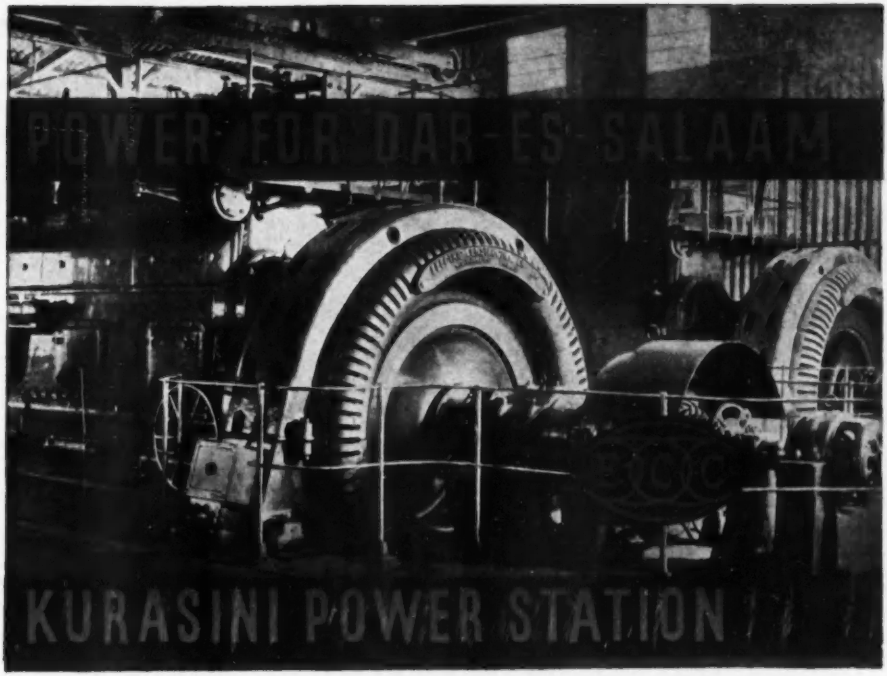

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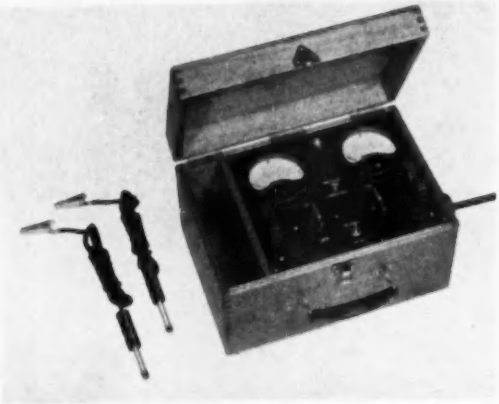

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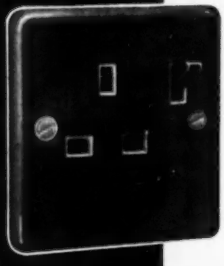

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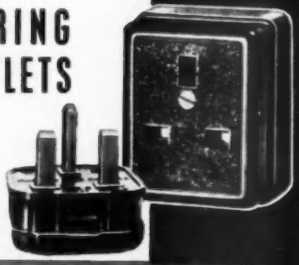

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This lighting scheme was installed by Messrs. A. S. Evans of Camberwell, and planned by the Illuminating Engineering Department of Thorn Electrical Industries Limited.

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Photograph by courtesy of British Railways

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In this modernisation scheme, just completed, it's Tudor all along the line. Current is purchased in bulk from the BEA Clarence Dock Power Station, a duplicate 33 k.V. supply being available. In this power station two 100-cell Tudor Batteries are installed, each with a capacity of 720 ampere-hours. In the British Railways distribution substations, no less than 29 Tudor Batteries are in operation, complete with rectifier charging equipment. For switch operating, emergency lighting and telephone supervisory control equipment—for all these purposes—Tudor again plays a vital part. Where the really big jobs are concerned, experience points to Tudor Batteries as the obvious choice.

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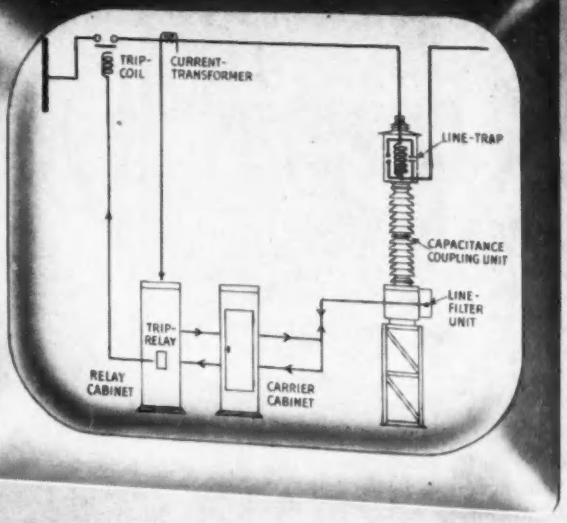

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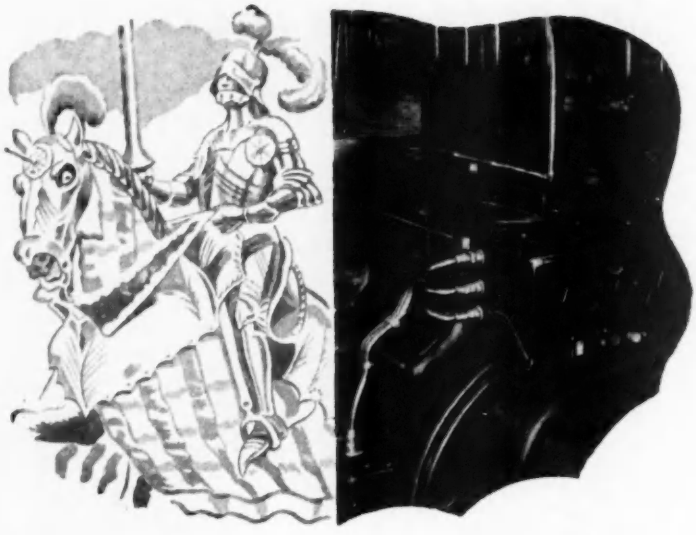

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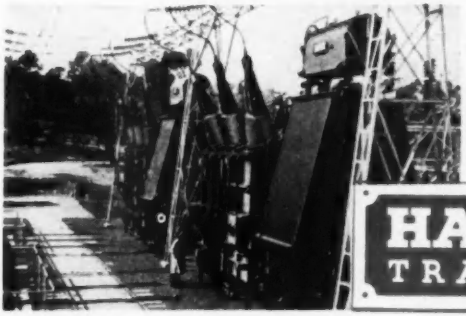

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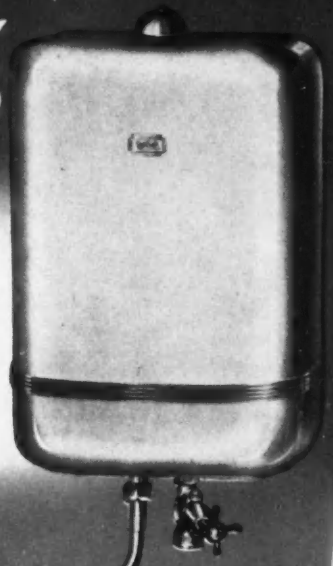

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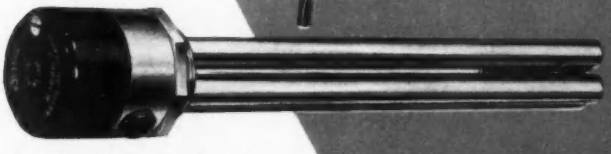

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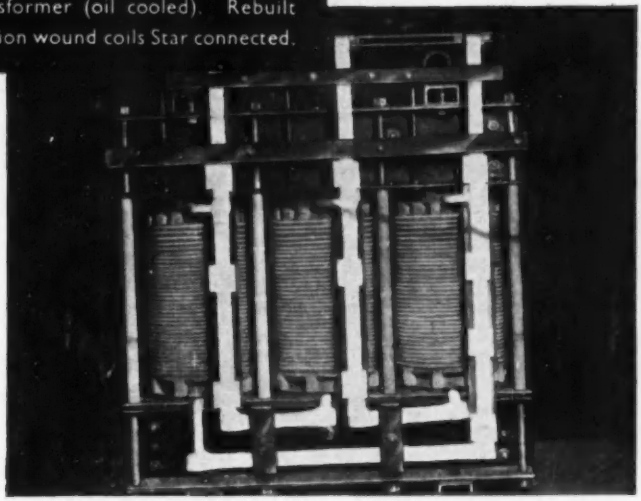

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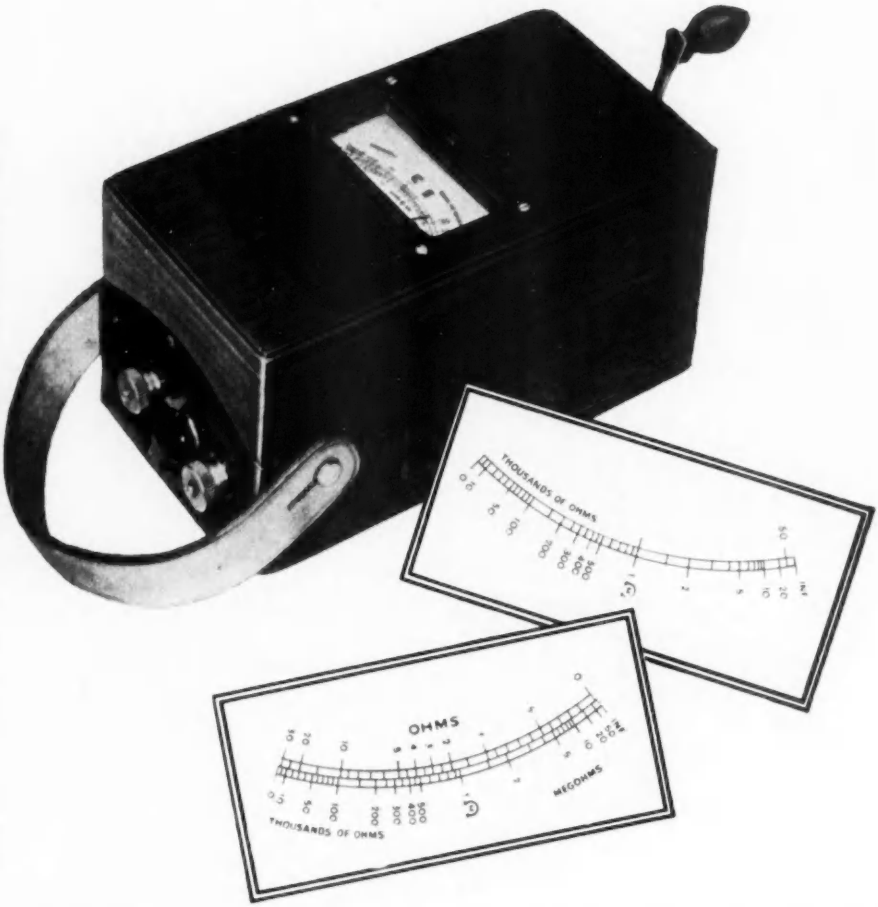

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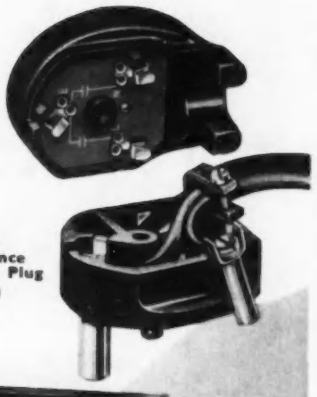

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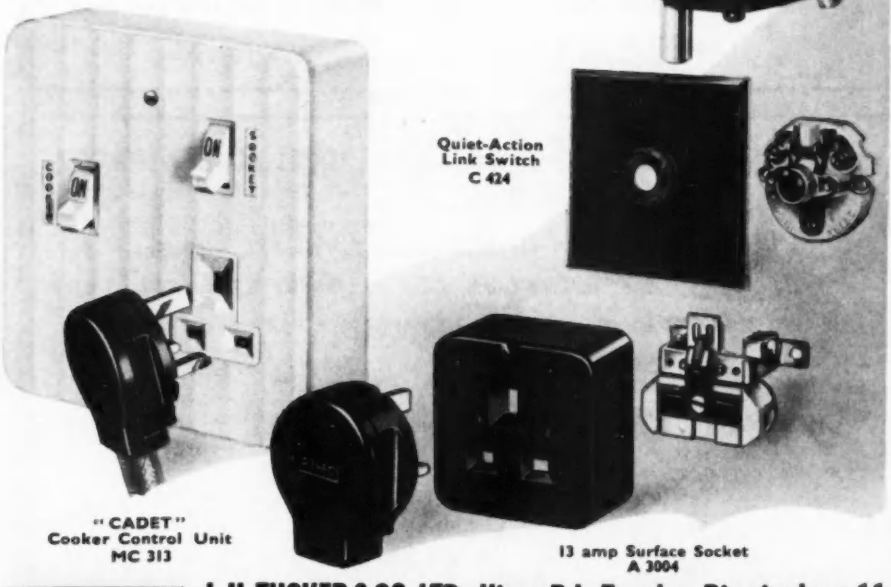

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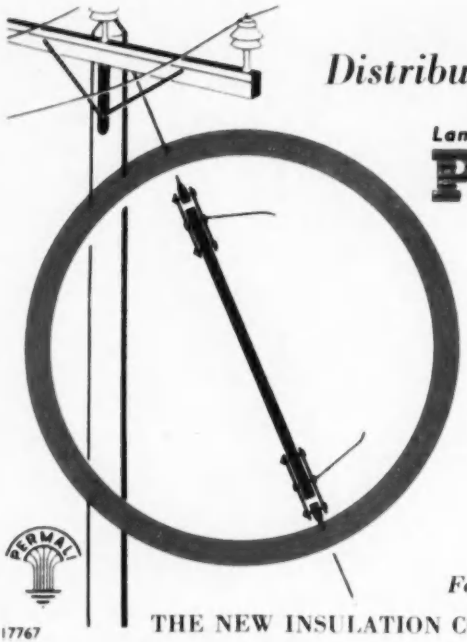

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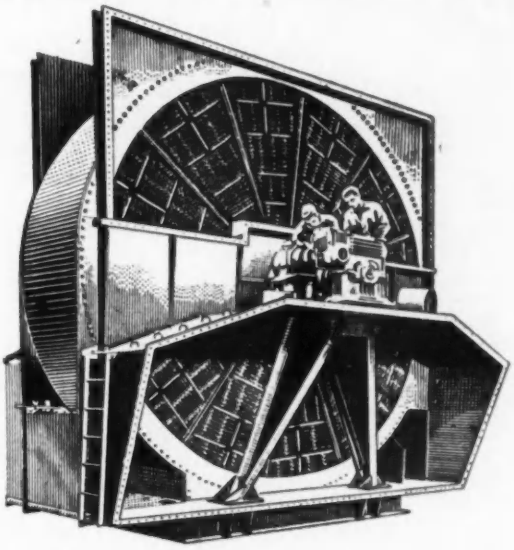

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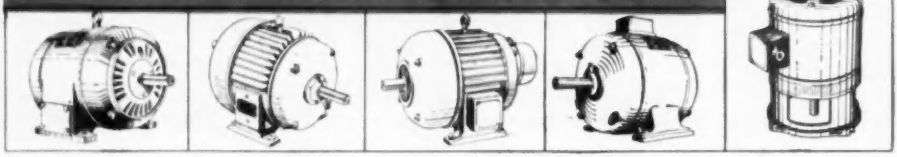

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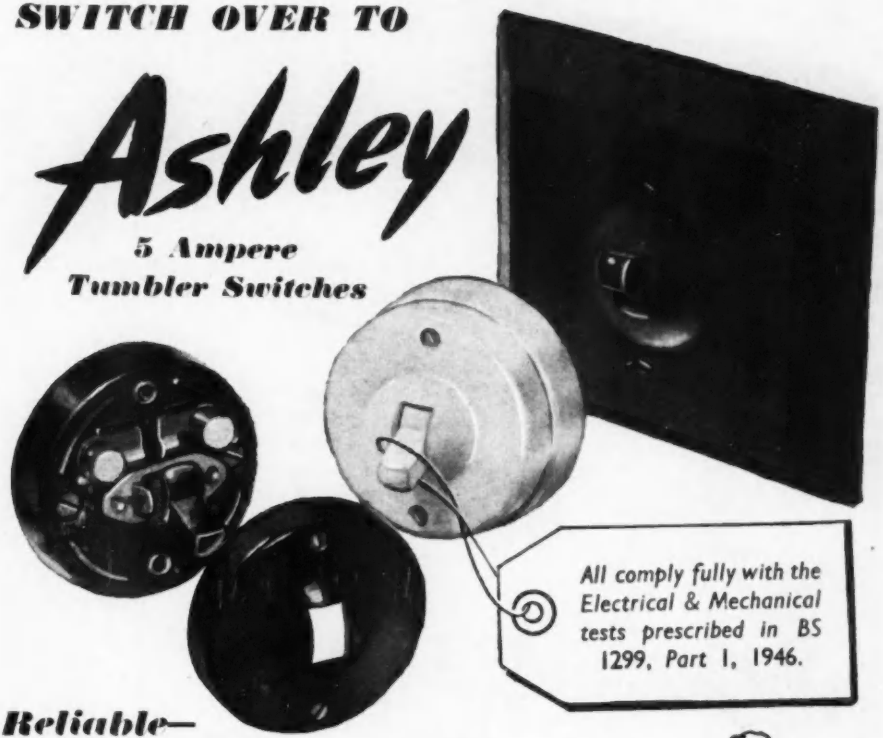

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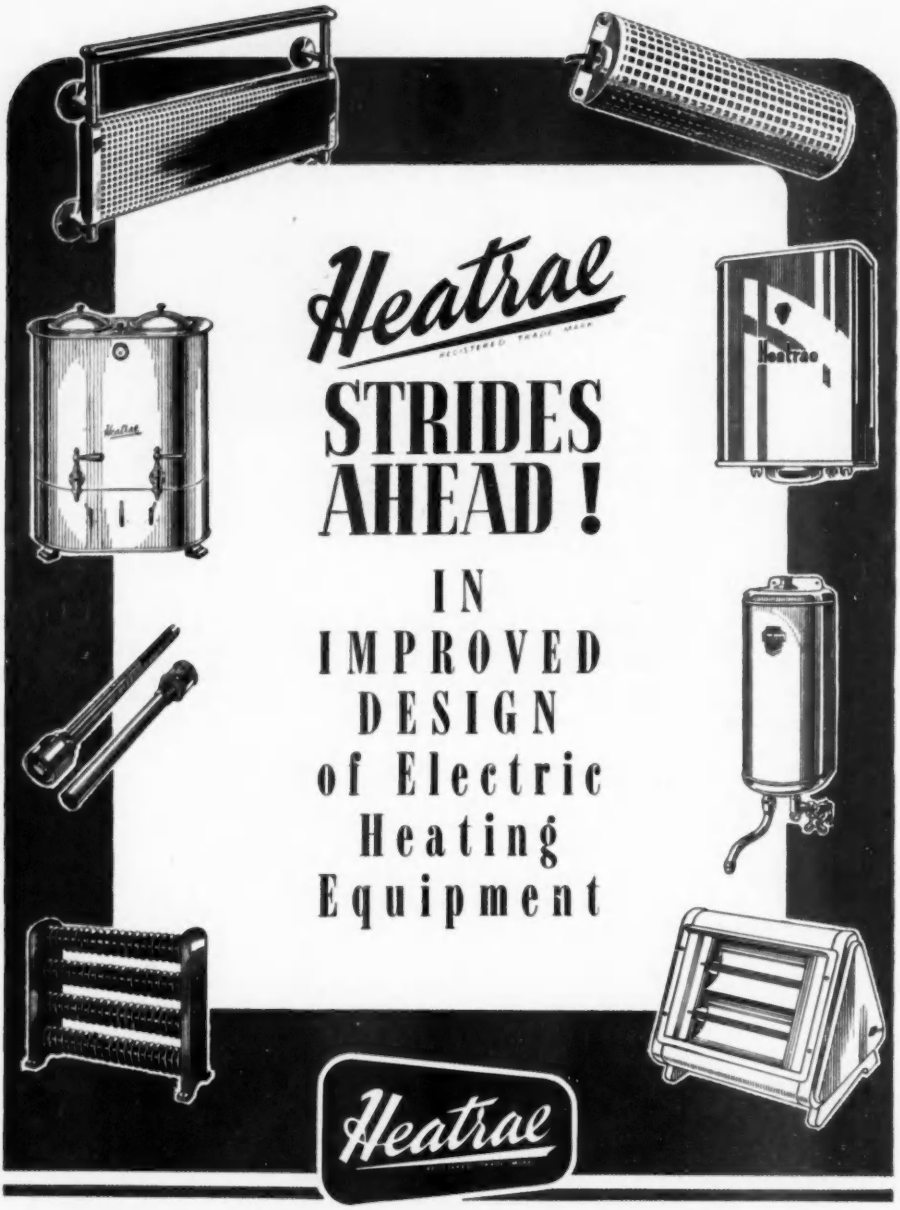

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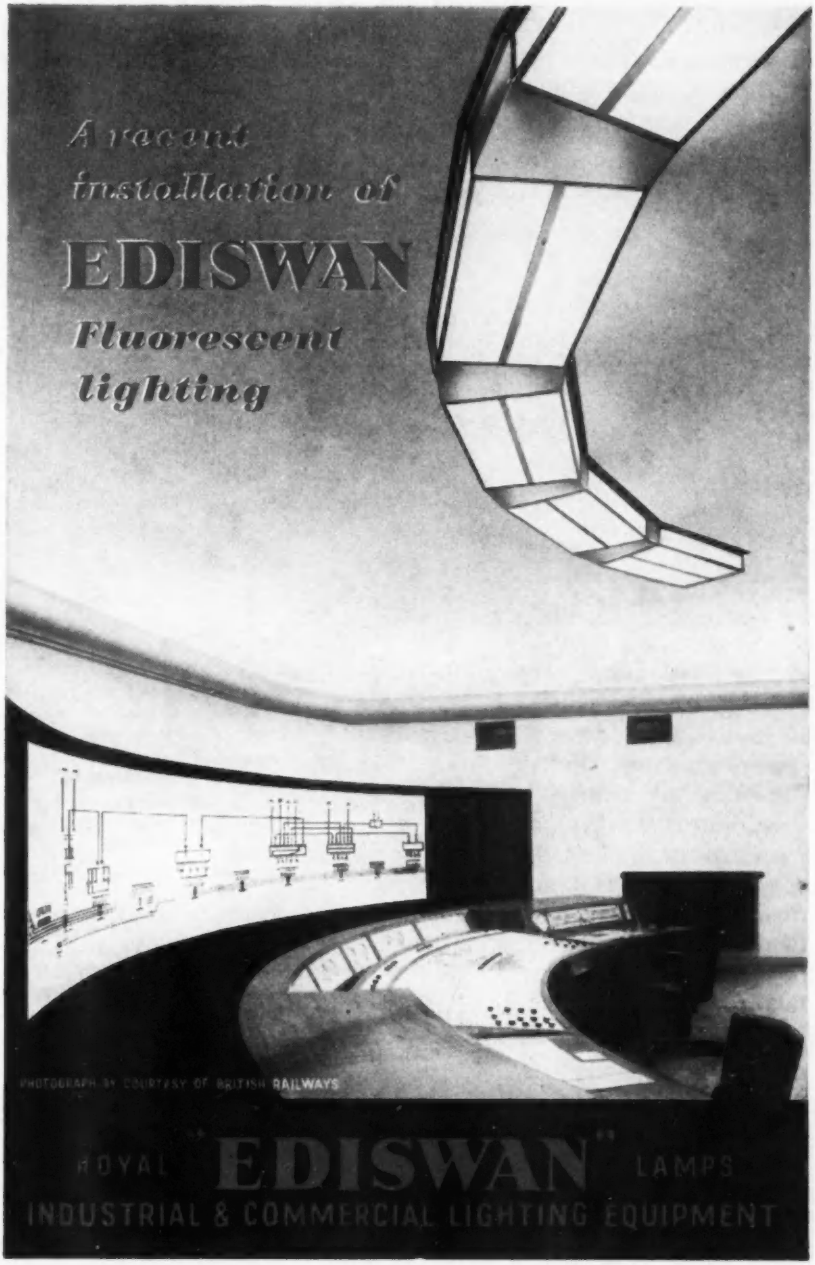

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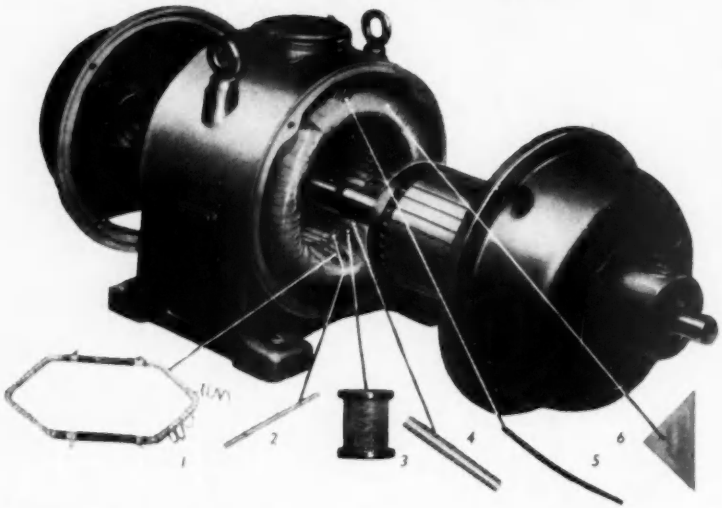

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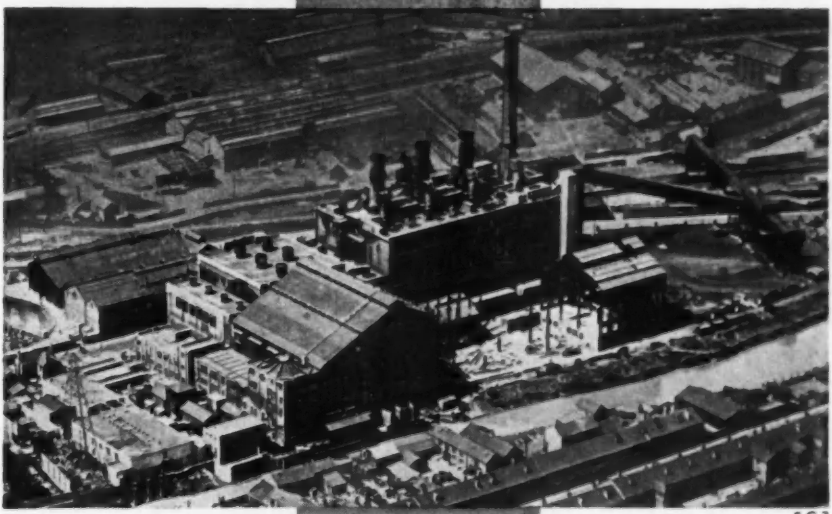

S.G.7

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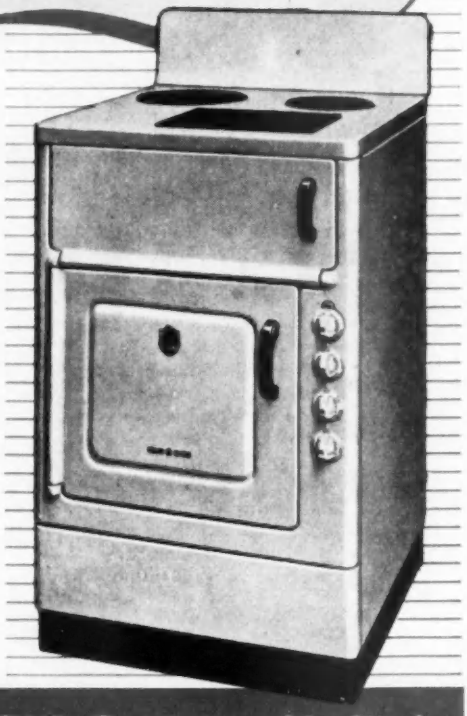

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See also 'English Electric' Fusegear advertisement, page 117

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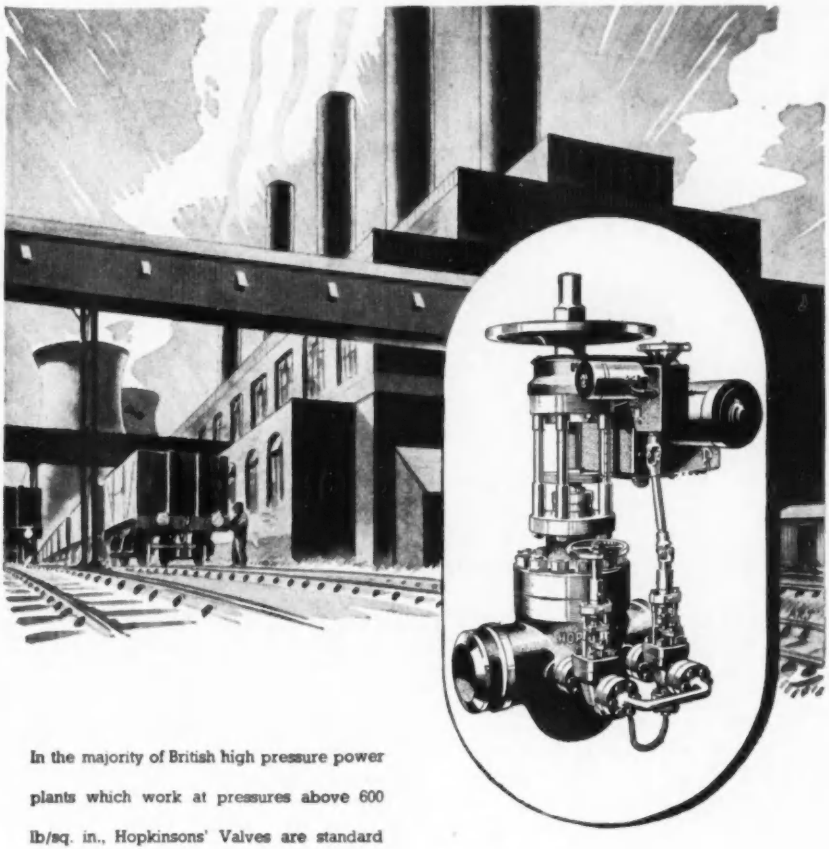

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ELECTRICAL TIMES

Vol. 117 No. 3059 THURSDAY, 22 JUNE, 1950

PUBLISHED EVERY THURSDAY

FIFTY-NINTH YEAR OF PUBLICATION

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Editorial

KEYSTONE IN PLANNING

PARLIAMENT and the Press give so much attention to the supply industry with its load shedding, capital limitations, and its tariffs, that the problems of the manufacturer are apt to be overlooked. Sir Vincent de Ferranti is naturally a champion of the manufacturers, so we sought in his presidential address a full exposition of their standpoint. In this, we must confess to some disappointment. True, he mentions such difficulties as the need for longer-term planning in factories than for the B.E.A. programme, and the major expansion in manufacturers' capital assets that are necessary to meet the vast increase in demand for electrical plant, but the address lacks that comprehensive viewpoint which we might reasonably have expected. Sir Vincent calls upon Lord Citrine to turn his blind eye to the restrictive signal of the Chancellor of the Exchequer, a viewpoint which has often been endorsed in these columns, but he himself turns a blind eye to the equation between capital and consumer goods, a solution of which is so vital to the country's wellbeing.

ECONOMICS IN EXTENSO

THERE WAS, however, no lack of comprehensiveness in the paper by Sir Henry Self, and this will surely rank, for some years to come, as the most authoritative survey of the economics of electricity supply. Perhaps there was little in it that was new to senior members of the industry in the audience, and on that account a fuller exploration of certain lines of thought would have been welcome, but this does not diminish our appreciation of this work. We cannot, however, share Sir Henry's belief that the present organisation provides a ready-made basis for comparison of operational and administrative efficiency of the individual units of the B.E.A. Indeed, in the following paragraph he outlines the difficulties that lie in the way of just such a comparison. It would have been more reassuring to be told what steps are being taken to this end, or even that the problem is, in fact, under active consideration by the B.E.A. A satisfactory assessment of the many variables is not easy to attain, but it is one which must be made if the present large-scale organisation is to be provided with a standard against which it may test its efficiency.

PROMOTIONAL TARIFFS

THE CLOW surcharge appears in the paper, but only as an unpleasant experience from which Sir Henry cautiously concludes that small tariff increases are unlikely to provide an effective check to peak usage under full employment. Can such a conclusion be drawn from the evidence of three months' experience, particularly in view of the unfortunate handling of this unfortunate policy? However, few will question Sir Henry's preference for tariff policies to encourage development of potential demand. The only doubt arises from the wide generality of the phrase he uses. It would indeed be news if this could be interpreted as an acknowledgement that the B.E.A. is committed in principle to promotional domestic tariffs, despite the qualification "at the right time." The two determinants to this latter phrase are plant shortage and the anti-inflation policy of the Government. The former hardly applies to high-load factor appliances, but it is on these in particular that purchase tax falls most heavily; present conditions favour instantaneous water heaters rather than the usual storage type, electric fires rather than thermostatically controlled radiators. Even though the B.E.A. were prepared to brave the Treasury dictum, it would be foolish to

introduce promotional tariffs in the face of this tax discrimination. Yet trading cannot be continued indefinitely on the basis of goodwill established in the past. Perhaps a change of heart in the powers that be may not be so very far off, so it would be encouraging if we could learn that plans are now being made in readiness for this "right time."

TURN ON THE HEAT!

ON MORE than on one occasion recently we have stressed the necessity for an all-out drive on the electric cooker, the output of which is still falling until, nowadays, only about one in every five cookers installed is electric. Support for our views was given in the presidential address on Tuesday morning, when Sir Vincent emphasised both the fundamental economic importance of the cooker to the supply industry, and the fact that it is largely an off-peak load. This latter aspect was also raised some months ago by Mr. S. F. Steward, chairman of the South-Western Board, who estimated that the doubling of the number of cookers connected in the Bristol area would add only ½% to the morning peak. There still seems, however, to be a lack of general appreciation of the seriousness of the position; with one or two notable exceptions, there is little or no indication that the industry as a whole is on its toes, and ready to overcome some of the obstacles in the way. Elsewhere in this issue, we publish two articles which indicate the nature of some of the obstacles, as seen from the independent viewpoints of a commercial officer and a cooker manufacturer. None of these are insuperable, but none of them will be overcome by the action of a single individual—or even a single Board. They demand concerted action by all in the electrical industry.

GAMBLE?

THE GREATEST obstacle of all would seem to be that the supply industry itself has a divided opinion upon the matter—which is, after all, understandable. Sound engineering principles demand a conservative policy, and the avoidance of load-building campaigns until the gap is closed. The natural instincts of the commercial side of the industry demand a gamble, an all-out effort now, lest what the *Electrical World* has referred to as "the habit of not selling" should become so ingrained in us that we find ourselves in five years time with adequate generating capacity—and no new load to pay for it. Unfortunately, this is one problem which demands a decision one way or the other, there is no room for the compromise, the "sane middle course" so beloved of the British temperament. A half-hearted attempt at a limited selling campaign, with provisos, quotas, and restrictive clauses, is going to be worse than useless. It must be all or nothing—and we must make up our minds soon.

SAUCE FOR THE GOOSE . . .

CORRESPONDENCE received in the last few months has laid some stress on the lack of technical qualifications being a bar to promotion for men in the supply industry. It was, therefore, with some surprise that we received a communication published elsewhere in this issue, from the Association of Electrical Housecraft Advisors, indicating that these principles do not appear to be applied with the same rigidity to women in the industry. As the most intimate contact between Area Boards and the domestic consumer, the demonstrator has the power to make or mar not only sales but goodwill, and the public's attitude towards the electricity service will tend to be coloured according to her ability and experience. Despite this fact, the A.E.H.A.'s communication would seem to indicate that some Boards are taking the risk of appointing unqualified women to certain of the more senior posts. It will, of course, be pointed out that Boards are having difficulty in obtaining staff of the right calibre. This, admittedly, is true, but we feel that it is largely due to the lack of adequate publicity for the new salary scales negotiated, which were reviewed in our issue for April 6. If domestic science students realised the prospects which the supply industry now offers, there should be little difficulty in obtaining the right type of entrant.

Meteor

Stourport "B"

Slag-tap furnace is one of many interesting features

EXCEPTIONAL in design and construction, the new Stourport "B" power station of the Midlands Division contains many technical points of interest to the power engineer. Principal among these are the unusual station lay-out, the slag tap furnace and the comprehensive instrumentation. The station, of which the first section is in an advanced stage of construction, is designed to have an ultimate capacity of 120 MW composed of two 60 MW sets. They will not, however, as originally conceived, be operating under identical conditions as the first unit will be working at 1,250 lb/sq in., 950° F, while the second is scheduled to be at 1,500 lb/sq in., 1,050° F.

Site Problems

The station site is alongside the existing Stourport station which is located at the confluence of the River Severn and its tributary the River Stour. The area is somewhat liable to flooding and as a result the basement level of the new station is the same as ground level. However, ample supplies of cooling water are available and good facilities exist for the delivery of coal to site by rail. Railborne coal is delivered on an elevated siding carried on a reinforced concrete structure which also carries beside the three sidings, three tipplers and a locomotive shed. Underneath the siding a conveyor belt system enables the coal to be distributed to store or direct to the boiler hoppers of "A" and "B" stations as required. Reclaiming coal from the store is by drag scraper and by carry-all scrapers and bulldozers.

Coal Handling

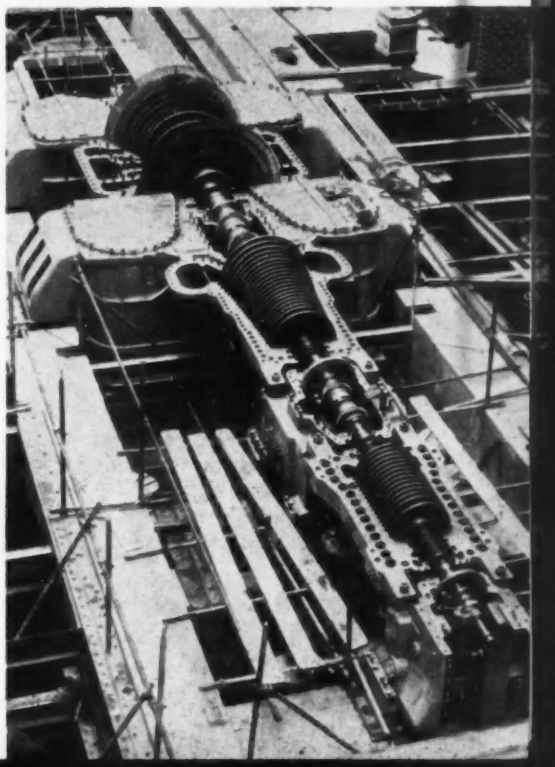
In the "B" station, the coal is taken to the roof of the boiler house and distributed by an automatic travelling tripper into the main bunkers. An auxiliary sampling equipment fitted to the tripper, periodically allows a small sample of coal to travel forward on the main conveyor belt. This sample is collected off the belt, pulverised in a small mill and then transmitted by a smaller conveyor system to the chemical laboratory for analysis. By this means, a continuous estimation can be made as to the calorific value, moisture content, ash content and consistency of the incoming fuel.

Coal from the bunkers passes through, or may bypass, the automatic weighers located just above the basement floor level. From the weighers, Redler conveyors transport the coal to subsidiary mill hoppers which are fitted with automatic switches operating at high and low coal levels. By this arrangement the bunkers need not be located directly above the mills and in some cases, may reduce the height of the building.

Boiler Plant

The boiler, the first of its type in the country, is designed for a maximum continuous rating of 525,000 lb of steam per hour at a pressure of 1,275 lb/sq in. superheated to 975° F. Fuel is blown in from the pulveriser mills—of which there are four, each with a maximum capacity of nine tons per hour. This number of mills allows for one mill to be out of commission for repair every four months. The unusual feature of the boiler, however, lies in the furnace, which is the first slag tapping furnace erected in this

View of turbine showing plant in course of erection. H.p., i.p. and l.p. shafts placed in position superficially for checking alignment of bearings



country. As can be seen from the line diagram, the fuel enters the furnace—which is divided into two sections—in a downward direction through eight vertical Intertube type burners. The first section of the furnace is the "molten" side, the other section being the "dry ash" portion. As the burners fire downward from the arch toward the floor of the first section, the ash in that part is kept in a molten state and can thus be continuously discharged into a hopper which is kept partially filled with water. The rapid contraction and solidification of the molten slag as it descends into the water results in its disintegration and it can be carried away by a flushing water system.

Both the molten and dry ash portions of the furnace are fully water-cooled by bare tubes and the division is formed by baffled tubes opened to provide a gas outlet at the bottom.

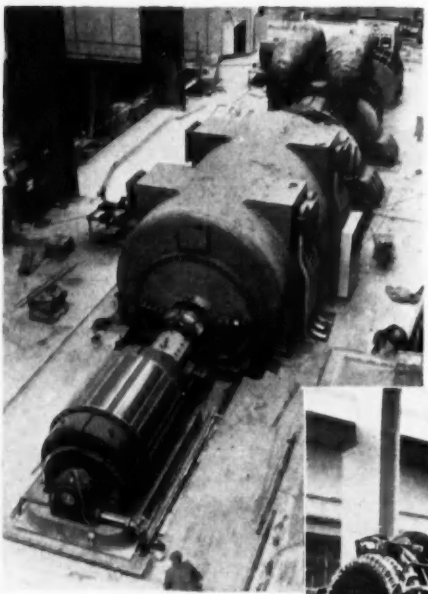
The superheater, which is of the pendant type, is in two stages with multicell attemperators between the stages, and has a total heating surface of 19,238 sq ft, and the economiser, of the continuous loop type has a heating surface of 22,920 sq ft. Both primary and secondary air heaters are provided, the former consisting of twin heaters with a total heating surface of 17,700 sq ft, with the tubes arranged horizontally, the gases passing outside the tubes and the air inside. The secondary air heaters, with a total heating surface of 148,600 sq ft have the tubes arranged vertically, with the gases inside the tubes and the air outside.

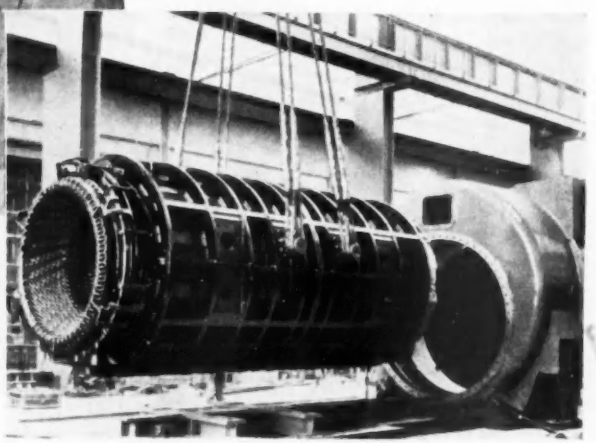
Both induced and forced draught fans (two of each) are of Howden manufacture and are driven by English Electric Co. squirrel cage motors through eddy-current variable speed couplings, thus ensuring fine control over a large range of loading and steaming conditions. Two mill fans, also by Howden, and driven directly by E. E. Co. squirrel cage motors, are installed, and each of these is capable of supplying the needs of all of the pulverising mills.

For the removal of dust and grit from the flue gases, Sturtevant electrostatic precipitators are used, these also being mounted with their ash hoppers at basement level, adjacent to the induced draught fans.

Sootblowing is carried out by electrically operated Babcock and Wilcox-B.T.H. blowers. Fifteen retractable units are installed in the secondary combustion chamber, four rack type blowers in the secondary superheater and six multi-jet blowers in the primary superheater.

Although the furnace is designed to burn normal types of coal, a careful check is required on the quality of coal entering the power station, as unsuitable fuel may result in the slag remaining below fusing temperature. It is for this reason that the continuous sampling equipment mentioned before has been installed.





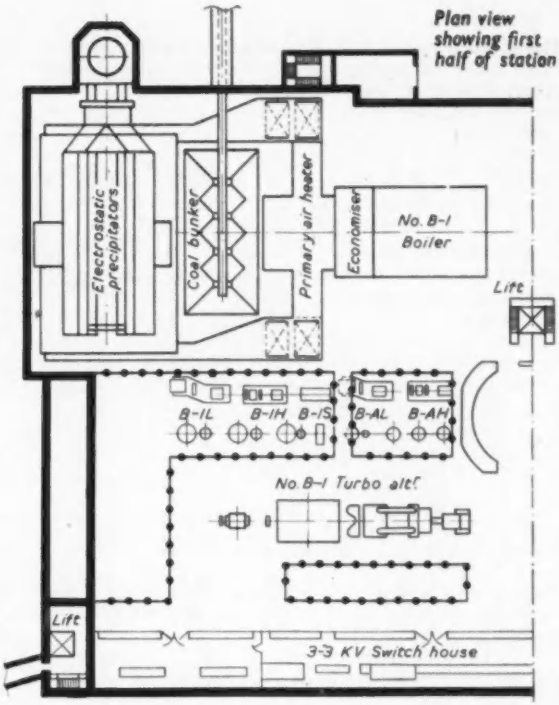
Above is a view of the completed set looking from the alternator end. On right, the core and winding is seen being inserted into the stator

Two ash sluice pumps are also installed, one for 100% duty and one as standby.

An unusual feature of the boiler is that oil equipment is fitted to give a load of up to 60,000 lb/hr.

Station Lay-out

The station lay-out can be seen from the plan view attached. On the south side is the 66 kV and 3·3 kV switch-house. The 3·3 kV supply for unit auxiliaries is provided by the house alternator driven by the main turbine. At the west end of the switch-house is the exciter room containing two slow speed excitation units. The turbo-alternator is parallel to the south wall. Just beyond the alternator is the basement opening in which are mounted the evaporating plant and the feed water heaters, and also the feed water pump line. The turbine operating and boiler operating floors are at the same level and between the turbine and boiler house at the centre of the completed station is the main control panel, also at turbine floor level. When the second set and boiler are installed a second control panel will be erected so that the station may be controlled from one central position.

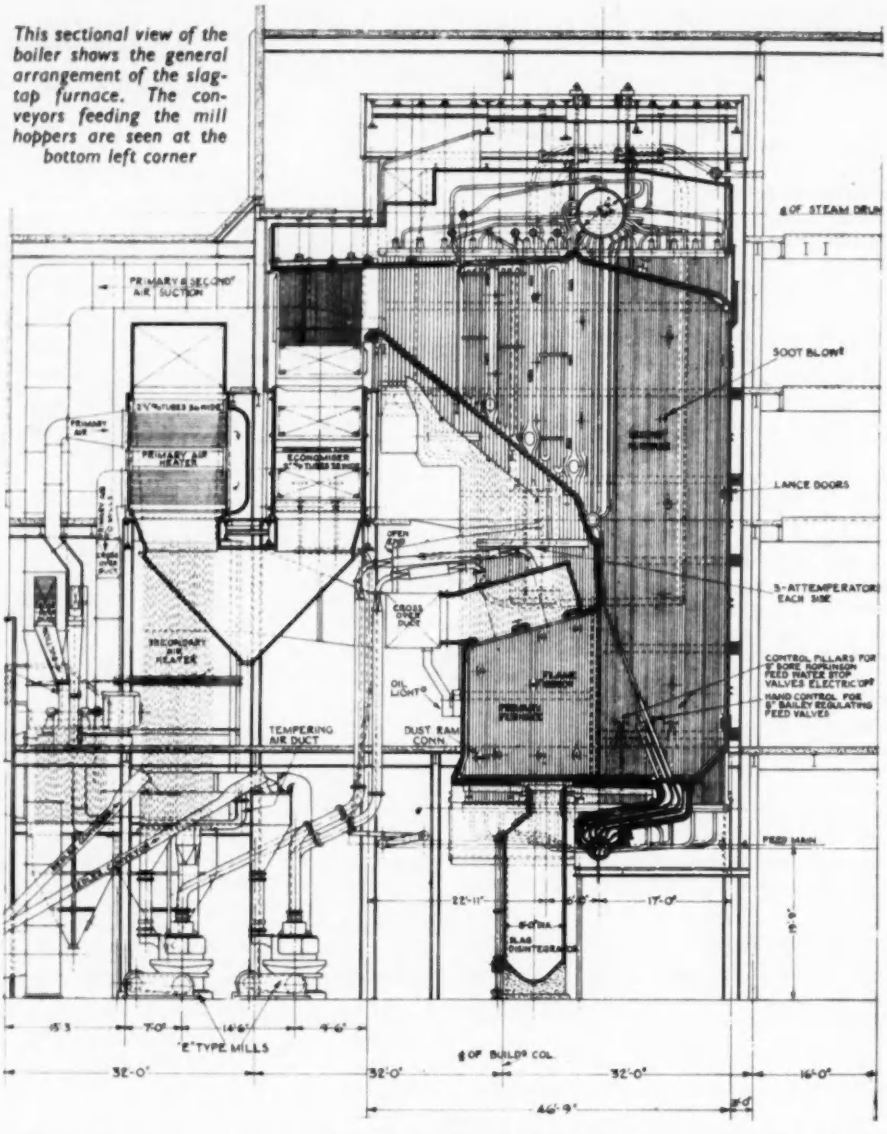


To facilitate maintenance, the turbine room is divided into two bays, each with a separate crane. One of these covers the turbo-alternator and the other, of lighter construction, serves the feedwater pumps and heaters.

Turbo-Alternator

The turbo-alternator is of English Electric manufacture and consists of a three-cylinder in-line machine running at 3,000 r.p.m. and driving main and auxiliary alternators. The twin condensers are of the divided two-flow type so that one half may be cleaned while the machine is running on partial load. Each condenser has an independent axial flow c.w. pump and a vertical condensate extraction pump. Steam pressure at the stop valve is 1,250 lb/sq in. gauge, and the steam temperature is 950° F. Five-stage feed heating is employed to give a final temperature of 460° F. In place of the usual shaft-driven oil pumps, there are two a.c. motor-driven oil pumps and should the first fail, the second is brought in automatically. In the event of the a.c. supply failing, a third d.c. motor-driven pump comes into operation. Maximum continuous rating of the main alternator is 55·5 MW at 11·8 kW, 0·8 p.f., and that of the auxiliary alternator is 4·5 MW at 3·3 kV, 0·7 p.f. Hydrogen cooling at 0·5 lb/sq in. gauge has been adopted for the main alternator, which carries the circulating fans on the shaft and has the gas coolers located transversely in the top of the stator casing. The core assembly and windings are not an integral part of the stator, and were shipped separately and inserted on site. In order to eliminate vibration as far as possible, the core assembly is flexibly mounted within the stator frame. As can be seen from the illustrations, the centre line of the shaft is not coincident with that of the stator casing, but is some distance below it. This is to allow room for the tube nests of the coolers to pass through the stator casing above the core assembly. Air cooling has been used for the auxiliary alternator.

In accordance with extending practice, excitation is derived from slow-running motor-driven sets mounted in a special room at the west end of the 3·3 kV switch-house. Two sets—one as a standby—have been installed. Each consists of a motor driving two main and one pilot exciter, one main exciter being for the house set



This sectional view of the boiler shows the general arrangement of the slag-tap furnace. The conveyors feeding the mill hoppers are seen at the bottom left corner

and the other two controlling the main alternator. Consideration was given to the introduction of flywheel exciter sets as are installed at Littlebrook, but it was decided that the operating conditions would be amply satisfied by the use of straightforward coupled machines.

The auxiliary equipment required for hydrogen cooling is installed in the basement and consists of scavenging and charging plant, together with the necessary sealing-oil gas detraining equipment. The coolers for cooling the circulating water to the alternator gas coolers are also mounted in the basement. Advantage has been taken of the clean foundation block design to provide a transverse passage through which not only the tail end connections pass but also the circulating water and other pipes to the hydrogen coolers. At present,

the intention is to run the machine at about 0·5 lb/sq in. above the atmospheric pressure, but provision has been made for this to be increased as operating experience may dictate.

Auxiliary Equipment

Both steam and electrically driven feed water pumps are employed, there being one steam unit and two motor driven units, each capable of handling 640,000 lb/hr. The electrically driven units each consist of two separate units (high pressure and low pressure) in series. One of these is of constant speed and one variable, control of the rate of injection being exercised through the latter. In the event of an electrical failure, the steam driven pump is automatically brought into action. All five units are mounted in line in the basement and easy maintenance is possible due to the secondary crane which runs over the well. The circulating water pumps are also installed in the station on the south side of the turbo-alternator, between the 3·3 kV switch-house and the condenser, which has a design vacuum at m.c.r. of 28·75 in. Hg., with cooling water at 65° F. The two pumps are capable of circulating 2,520,000 gal per hour for the condenser; in addition two auxiliary circulating water pumps supply 31,200 gal/hr for the oil coolers, 45,000 gal/hr for the main alternator hydrogen cooling, and 15,000 gal/hr for the auxiliary alternator air-cooling.

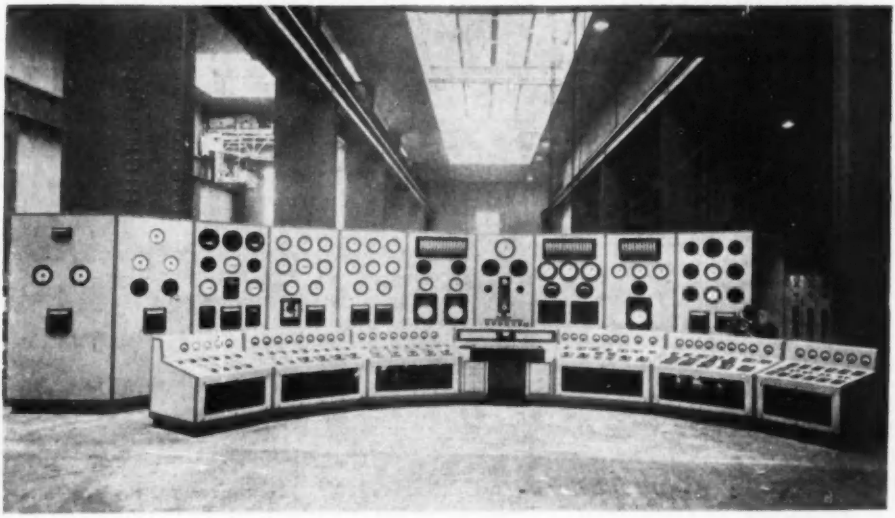
Two extraction pumps are fitted each for 100% duty, and three air ejectors—two for 60% duty and the other one for 40% duty.

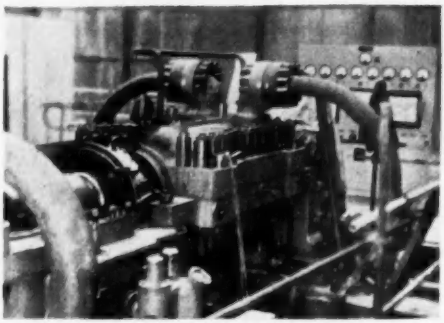
It will be noticed by the foregoing that the amount of standby and available auxiliary plant is considerably higher than that generally found in most stations. This is mainly due to the fact that the station when originally designed was to house two similar sets and provision had been made for standby plant for both units, and also because the station is somewhat in the nature of an experimental unit. For this latter reason a remarkable amount of instrumentation and supervisory control has been installed. Complete control of all plant can be exercised directly from the central control position. The turbine itself is fitted with continuous recording instruments to measure axial displacements between shaft and casing, shaft deflection and eccentricity, vibration and such items as throttle valve opening.

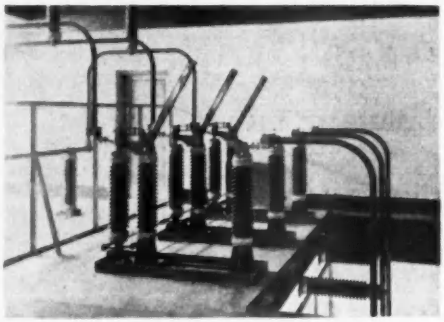
Switchgear

The 11 kV supply from the main alternator is stepped up to 66 kV by an outdoor transformer. Air blast circuit-breakers are installed, operating at 66 kV, with a rupturing capacity of 1,500,000 kVA. The isolating switches are also remotely operated from the control room by compressed air. A feature of the lay-out is that no cable connections are employed for the main generator circuits, which are connected by a busbar system of bare copper rods carried in a passage in the foundation block. The

Unit control panel and desk during erection. The space on the right has now been filled by the soot-blowing panels







Left is a view of the h.p. cylinder, and on the right are the pneumatically operated isolating switches

interconnectors to Station A switchgear, and also the outgoing feeders, are oil-filled single-core cables. A 6,000 kVA transformer is also provided for stepping down the voltage to 3·3 kV for station supplies. It also can supply unit auxiliaries during starting up of the main turbo-alternator or in case of emergency.

Conclusion

In conclusion, the general impression gained by a visitor to the station is that of a tidy, well-thought-out layout designed for maximum efficiency with the expenditure of a minimum amount of labour. The large amount of remote control installed should enable the station to be run as an effective unit, and the careful attention paid to minimising dust and noise —the walls of the turbine room are accoustically treated—should make it a pleasure to work in.

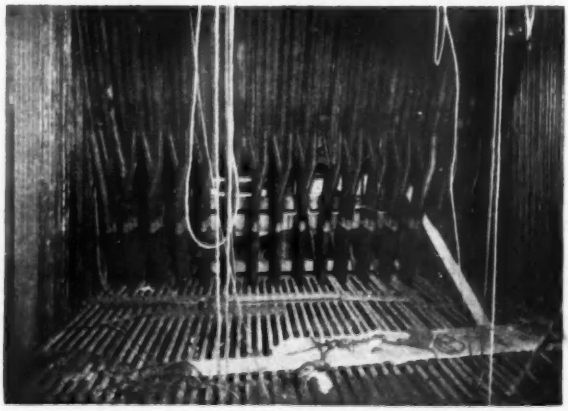
Our thanks are due to Mr. F. E. Ames, Generating Engineer (Construction), Midlands Division, South, and to Messrs. Ewbank and Partners Ltd., consulting engineers, for this information and for permission to visit the station, and to W. A. Fortens, Studio House, Kidderminster, for the photographs accompanying this article.

The architects, Messrs. Farmer and Dark, are to be congratulated on a fine-looking building.

LIST OF CONTRACTORS

Civil and building works, roads, culverts, floors, walls, roofs, etc.: Sir Robert McAlpine and Sons, Ltd.
Steelwork: Dorman, Long and Co., Ltd.
Boiler unit: Stirling Boiler Co., Ltd.; Howdens Ltd.,
Turbo-alternator: English Electric Co., Ltd.
Condensing and feed heating plant: English Electric Co., Ltd.; Hick, Hargreaves and Co., Ltd.; Drysdale and Co., Ltd.
Boiler feed pumps: G. and J. Weir, Ltd.
Main circulating water pumps: Drysdale and Co., Ltd.
Auxiliary circulating water pumps: Harland Engineering Co., Ltd.
Coal handling plant: Spencer (Melksham), Ltd.
Coal feed to P.F. mills: Redler Conveyors Ltd.
Ash and dust handling plant: Babcock and Wilcox, Ltd.
H.P. and L.P. pipework: Aiton and Co., Ltd.
H.P. valves: Hopkinsons, Ltd.
Engine room crane: Stothert and Pitt, Ltd.
Unit control board: Bailey Meters and Controls, Ltd.
Fire extinguishing plant: Mather and Platt, Ltd.
Circulating water band screen: F. W. Bracket and Co., Ltd.
Stationary circulating water screens: Ledward and Beckett, Ltd.
Heat pump plant: Rosser and Russell, Ltd.
Vacuum cleaning plant: Sturtevant Engineering Co., Ltd.
Storage tanks: South Durham Steel and Iron Co., Ltd.
Raw water filters: United Filters and Engineering, Ltd.
Transformers: English Electric Co., Ltd.
66 kV switchgear: English Electric Co., Ltd.
3·3 kV switchgear: English Electric Co., Ltd.
66 kV oil-filled cables: Pirelli-General Cable Works, Ltd.
400 V contactor panels: Contactor Switchgear, Ltd.
Mercury arc rectifiers: English Electric Co., Ltd.
Station battery: Chloride Electrical Storage Co., Ltd.
Telephone and alarm equipment: Standard Telephones and Cables, Ltd.
Cabling and wiring: London Electricity Board.

View of primary furnace from front of boiler



The Cooker Position

—A VIEWPOINT FROM THE SUPPLY INDUSTRY

expressed by a Commercial Officer

THE present position of the electricity supply industry with regard to the development of the domestic cooking load is most unenviable, and a good deal of frustration is felt by the commercial staffs of Electricity Boards, who know that they have "the goods" to sell but are prevented by circumstances beyond their control from going all out with cooker development as they would like to do.

Present Limitations

In the first place there is the limitation imposed by the former Electricity Commissioner's letter of February 18, 1948—forgotten by many but nevertheless still on the files as a reminder that the Electricity Boards are not yet free to indulge in a "cooker drive." In many country districts there is the even more practical limitation of mains capacity: it must be remembered that very little expenditure on mains improvement was permitted during the war and that there is a great deal of leeway to make up.

A further difficulty, presented through the medium of the Regional Boards for Industry, is the attitude of some industrialists who are strongly critical of any attempt on the part of the Electricity Boards to meet even the most reasonable requirements of domestic consumers. In so far as this criticism is levelled against the installation of electric cookers it can be shown that the effect on the peak load is very small indeed.

The normal peak load usually occurs between 8 a.m. and 8.30 a.m. when the day shift in factories is getting under way and most families have to cook their breakfasts before 8 a.m. in order to enable the "bread-winners" to get to work and the children to get to school. It is true that lunchtime cooking comes on at about the time of the noon peak, but there is considerable diversity on the lunchtime cooking load due to the varying habits of different families: in any case, the noon peak is usually much less than the early morning peak.

Finally, there is the severe restriction imposed by the present Government's policy for limiting capital expenditure which is having a serious effect on the development of the domestic cooking load. Apart from capital required to maintain and extend simple hire schemes where they are in operation most boards require a certain amount of working capital for financing schemes of hire purchase and credit sale, especially in view of the fact that these facilities were generally discontinued during the war and consequently fresh working capital was required when they were re-started. Under present circumstances it is inevitable that the capital allocation for hire and hire purchase schemes must suffer and yet these schemes are vitally necessary in view of the relatively high price of electric cookers today.

Competition with Gas

All these restrictions are particularly irksome at a time when the Gas Boards are going "all out" in a drive to increase the number of their cookers in use. Presumably the gas industry has its own problems with regard to limitation of capital expenditure and reinforcement of mains, but it has never been singled out for the attention which has been focussed on the electricity supply industry ever since the beginning of the war. It is well known, of course, that the cooking load is vital to the gas industry now that interior and exterior lighting by gas is a back number. Any serious loss of the cooking load by the Gas Boards would soon affect their finances adversely.

The electricity supply industry must be realistic in its attitude towards gas cooking. It is no good attempting to drive the gas industry out of the domestic cooking field—such an attempt could only result in "cut throat" competition in which the gas industry would come out best in view of the fact that gas cookers will always cost somewhat less than electric cookers by nature of their construction. Whilst not seeking to monopolise the domestic cooking field, the Electricity Boards must see that they get a substantial proportion of this load—considerably more than they are getting at present. Electric cooking is an essential

part of the service which the Electricity Boards have to offer to their consumers, and it is also essential to the economy of the boards.

The Electricity Boards will have to tackle urgently the question of the cooking requirements of the local authorities' new housing programmes—especially in view of the fact that most new houses being built today are Council houses. Far too many local authorities are equipping their new houses with gas cookers in order to save a few pounds on initial cost and are not attempting to give their tenants a free choice of electric or gas cooking (this refers, of course, to houses where no solid fuel ranges are installed). Local authorities must realise that if they persist in this policy the Electricity Boards will undoubtedly have to ask them (and in some cases are already so doing) to contribute towards the cost of the mains supplying the housing estates. This is not a threat in any sense but is plain hard commercial necessity.

Due to the heavy cost of electricity mains and substations today few new housing estates will show a gross revenue return on capital expenditure of more than 8% to 10% if the supply is used only for lighting, radio and small apparatus, and no Electricity Board can continue indefinitely to supply electricity under such conditions. The contribution required towards the cost of the mains should be waived where the Local Authority gives freedom to their tenants to choose whether they prefer electric or gas cookers and washboilers, etc.—surely a very reasonable suggestion. Where proper freedom of choice is given to Council housing tenants, the Electricity Boards have no reason to fear the consequences.

Simple Hire

Next a word about simple hire, since this appears to be a controversial issue within the ranks of the electricity supply industry today. There is still a considerable demand for hire purchase or credit sale facilities, and saturation has not by any means yet been reached in this field. The Gas Boards sell their better quality cookers, finished in coloured vitreous enamel, for about 2s. 6d. or 3s. a week (spread over five years on hire purchase) and the Electricity Boards can also sell their better quality cabinet type cookers for roughly the same weekly instalments providing the payments are spread over a period of seven years. There is not very much to fear from the Gas Boards on the better quality cookers—after all, there are features of electric cooking which will always appeal to the discriminating section of the public: cleanliness, lack of fumes, superior oven performance, etc.

There are, however, many families who are not prepared to commit themselves to a payment of 2s. 6d. to 3s. a week for seven years, and it is necessary to get down to a weekly charge of about a 1s., without any long-term commitment, in order to obtain cooking business from these families. This can only be achieved by simple hire, and the cooking business is so vitally important to the Electricity Boards that it is essential that hire schemes should be continued and extended. Simple hire schemes for electric cookers, at low rentals, have been an essential feature of the electricity supply service for years, and it is difficult to see why they should be dropped now when the Industry is facing severe competition from the Gas Boards. It must not be overlooked that in many areas the Gas Boards are letting out their older model cookers with no hire charge whatever.

In order to keep the simple hire cookers distinct from the coloured cabinet type cookers which are sold on hire purchase or credit sale, it is advisable to adhere to the conventional "utility" design on legs for the former but the electrical specification should be in no way inferior to that of the cabinet models. This policy has been criticised by some manufacturers, but it must be realised that there is no need to introduce simple hire to the exclusion of hire purchase, and if this hypothesis is accepted then it is unwise to offer on simple hire at low rentals the identical cookers which are offered on hire purchase at 2s. 6d. to 3s. a week. It follows, therefore, that the "frills" must be cut out of the simple hire cooker.

Cooker Prices

And now a few words to the manufacturers —firstly on the price question. A serious attempt must be made to reduce the list price of the better quality cookers which are sold outright or on hire purchase and credit sale—the cost of this reduction in price to be shared equally between the Electricity Boards and the manufacturers. It would certainly be in the interest of the Electricity Boards to forgo some of their handling discount providing the manufacturers are prepared to contribute a similar amount towards the reduction in list prices. Manufacturers may insist on the purchase of larger quantities of cookers by the Boards as the only practicable way of achieving their share in reducing list prices and serious consideration would have to be given to this request. However, a substantial reduction in

the list prices would result in a useful increase in the turnover of cash sales through the service centres and since this would not involve the Boards in any appreciable increase in working capital, it should be achieved without adding to the financial difficulties mentioned in this article.

The price of simple hire cookers must also be reduced in order to encourage more Boards to view simple hire with favour and this would automatically result in a greater turnover of business for the manufacturers although this would admittedly be controlled to some extent by the present limitation on capital expenditure. However, such an essential part of the electricity service should come in for a reasonable allocation in capital expenditure budgets. The price of simple hire cookers should not be cut by reducing the electrical specification (i.e. reversion to solid boiling plates and non-automatic oven, etc.) as this would be short-sighted policy.

Finally there is the question of the technical specification. The oven performance of most electric cookers is excellent, but the hob performance is capable of considerable improvement. What is urgently required is a really fast radiant boiling plate with a quick "heat response" whether the loading is being varied up or down by operation of the switch or simmerstat—and yet a plate which will stand up to a certain amount of abuse which is sure to be encountered at times, especially with simple hire cookers. The transformer operated boiling plate is not the solution—good though it is—on account of its high initial cost and although there are on the market one or two really fast radiant plates it is not only the performance when the plate is up to heat which matters, but the time taken to heat up, and equally important, to cool down again for simmering, etc. There will undoubtedly be further developments in the design of boiling plates before long and then our gas friends will really have to sit up and take notice.

—AND THE SITUATION AS SEEN BY A MANUFACTURER

ANYONE who feels that there is occasion for complacency in the present situation of electric cooking would do well to study the comparative statistics of gas and electric cooker production. In 1947, the ratio was about 1·7-1, in 1948 nearly 2-1. Today it is well over 3-1. Nearly four gas cookers are sold for every electric one. The initiative won during the '30s by seasoned campaigners, has been handed back almost without a semblance of fight, despite the fact that in the immediate post-war years, public opinion was more than ever in favour of electric appliances for the home.

It is not often that a manufacturer can say what he really thinks regarding the retailing of his goods, since he cannot do so without criticising his customer—and the customer is always right! The situation is, however, much too serious to allow of undue delicacy, and these remarks are intended not as a safety-valve for any personal grievance but as a genuine effort to assist in the examination and rectification of the present unfortunate position. In this matter the writer speaks not for himself alone but for all cooker manufacturers. No manufacturer is concerned about the loss of business to one of his competitors. His worry is in seeing it go to the gas boards.

Attitude of the Boards

First and foremost, there is the attitude of the Area Boards themselves. With one or two exceptions, they seem to take this loss of business to the gas industry very lightly. Frequently, the writer has heard the opinion expressed that, since gas and electricity are both nationalised there is no longer any need for rivalry and, therefore, very little incentive to obtain business. Much of this inertia springs from the "don't use more electricity than you can help" theme which is not, even now, by any means dead. That feeling, engendered in the public mind by a campaign which was born of the same panic-stricken spirit that enforced the great shut-down of 1947, must be eradicated.

United Front?

Before we can even begin to think in terms of sales, the supply industry must speak with one voice and give whole-hearted support. Does this state of affairs obtain? Or is there existing a state of what has been described

elsewhere as a sales schizophrenia? In his book, *Sound and Fury*, Maurice Gorham gave his opinion that some B.B.C. executives dreamed of a B.B.C. untroubled by broadcasts. Is there a parallel here? Does a portion of the B.E.A. tend to regard consumers as an additional complication rather than their *raison d'etre*? Some weeks ago the chairman of the Eastern Board's consultative council expressed concern at the change in policy over load-shedding, imposing physical cuts in place of voltage and frequency reductions. The imposition of such a policy may be highly desirable from the standpoint of the industrial consumer whose production suffers with low voltage and frequency. It is, however, a poor foundation on which to build a cooker campaign.

Sales Policy

Just as the supply industry needs a consistent outlook upon load building, it must overhaul the present chaotic state of affairs on its policy regarding retailing of cookers. One Board will not hire cookers; another insists on new cookers of outmoded design for this express purpose. One Board will hire-purchase over seven years', another wants to complete the transaction in three; another has not yet made up its mind.

And the consumer—who could not care less which Board supplies him—is constantly finding that his facilities for procuring equipment, his method of paying for it, even his tariff, are different from those offered over the border, an imaginary and, to him, quite illogical and inexplicable, line some five minutes walk away. He is ready to co-operate, agrees that the sudden amalgamation of some hundreds of small authorities into one entity takes a bit of organisation, but he cannot see why, with the re-introduction of hire purchase since nationalisation, there should not be a consistent scheme which is arranged at Authority level or, at least, has the same pattern throughout the country—and the manufacturer is inclined to agree with him.

Inadequate Service

Another cause of loss of goodwill for Boards, for the manufacturer, and for electric cooking itself is the waste of time which frequently occurs in the satisfying of a consumer who has a cooker fault during the guarantee period. No equipment is perfect and anyone knows it. Manufacturers, of course, accept full responsibility for any failure or fault in their equipment during the period of guarantee but they are sometimes a little astonished at the lack of initiative on the part of the Board's staff. Since they accept *any* complaint while the equipment is guaranteed, why keep the customer waiting whilst letters are exchanged between Board and manufacturer—why not satisfy the customer and write afterwards?

Standardisation

Another bugbear to the manufacturer is the insistence on standardisation. Some Boards want it both ways. They criticise, and complain, and ask for the impossible—having themselves made it impossible by their insistance on standardisation. Interchangeability of spares is one thing—and a very good thing. To insist on standard external dimensions, so that all cookers look alike, makes it difficult to incorporate even minor improvements, while major improvements are almost out of the question.

Real Drive Wanted

If the electric cooker is to hold its own once more, real drive is needed in all quarters. Sales staffs must be told repeatedly that gas is going all out to regain lost business. They must know all the weaknesses of gas, and, using language and terms familiar to the housewife, draw a picture of back-aching toil, the eternal scouring and scraping, which is needed to keep the "old dirt trap"—the gas stove—in some sort of order. The gas industry will not pull its punches, and neither must we.

On top of this, the industry as a whole must have a profound understanding of the word "Publicity." Present advertising efforts are timorous, puny and inadequate. Unfortunately, the necessity for advertising is only appreciated by a limited number of Area Boards. The B.E.A. should challenge the Gas Council, nationally, in press advertising, and the Area Boards should individually continue the fight in the provincial press and the local weeklies. This would do more good than the present "More Power is on the Way" posters.

The cooker manufacturers feel that they are fighting the entire gas industry almost lone-handed. They undertake expensive trade and consumer press advertising, they provide large quantities of literature and cookery books, but all this is not enough.

The B.E.A. and Area Boards can, if they have the will, prove more than a match for the Gas Council and in their efforts they may be assured of the continued efforts of the manufacturers.

1950 B E P CONVENTION

HARROGATE 19—23 JUNE

RENEWING old acquaintances, collecting badges and catalogues, and finding the way about occupied much of Monday for delegates at Harrogate, although for B.E.A. delegates there was a meeting (reported on page 1042).

The Mayor of Harrogate, Lord Citrine, and Sir Vincent de Ferranti, were on the platform, with Convention officials for the opening of the Exhibition, which had been postponed until 5 p.m. Lord Citrine, as president of E.D.A., introduced Sir Vincent as the President of the Convention; as one whose lifetime's history had been one of interest and service to the electrical industry; and as head of an important firm. Sir Vincent said, "This is my first assignment as President of the 1950 Convention and I feel it very appropriate that it should be so because of the amount of work necessary to produce such an exhibition." He went on to thank people involved and said that he was glad that in a nationalised convention the function of the old I.M.E.A. Convention carried on. The exhibition provided an opportunity for manufacturers to show supply authority engineers what appliances were available for the day when they once more should actively sell electricity again. May that day, he said, come soon.

In the evening, with most of the delegates arrived, the first of the social functions which are so important and notable a part of the Convention was held. This was a formal reception of the delegates by the Mayor of Harrogate (Ald. C. F. Whitely) accompanied by the Mayoress, and was held at the Royal Hall, this year the venue for all the principal Convention functions except the annual dinner.

Tuesday began with another meeting with the Mayor of Harrogate, who accorded a civic welcome to the assembled delegates at the opening of the first session of the Convention. These civilities over, the business of the Convention got under way with the presidential address.

The Presidential Address

As the first Convention President to be chosen from outside the supply industry, SIR VINCENT DE FERRANTI, M.C., M.I.E.E., characterised his approach to the problems of the industry as "watching inventions and discoveries being applied over a wider and wider field for the benefit of man." Forty years ago it was apparent that with generation efficiencies of the order of 25% it would be possible to have a system of 25,000 MW spread in 100 stations of 250 MW each, giving the country as much energy from 60 million tons of coal as was then being obtained from 150 million tons. Today we are half-way, using 30 million tons of coal.

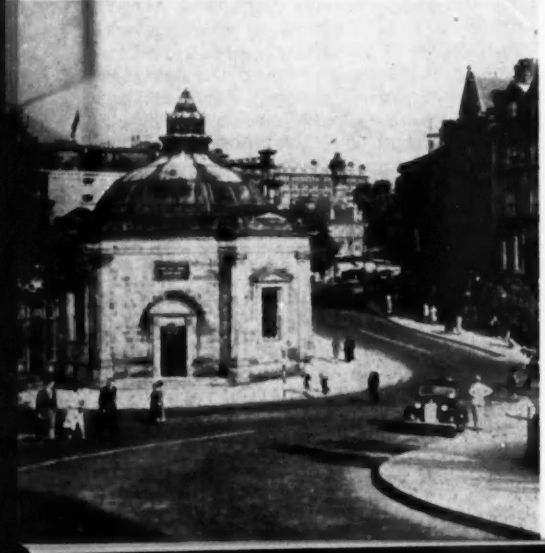
Last year the Convention dealt largely with transmission and distribution, this year generation is the subject: it is to be hoped that some future Convention will concentrate on the art

of utilisation. Such matters as the part played by electricity in preventing smoke pollution, and saving domestic building costs should be kept in mind. The assistance that can be given to the productivity of industry must be considered, too, especially at a time when at one end of the scale the financial requirements for the capital programme of the B.E.A. and the Area Boards has been cut down by the Treasury, and at the other end the use of the means of application is being stifled by purchase tax.

It might be necessary, suggested Sir Vincent, for Lord Citrine to "turn his blind eye to the telescope when the signal is hoisted to delay his action for the public good." In connection with the ordering of plant, it must be remembered that just as the B.E.A. has to plan a forward programme as regards the availability of capital and plant, so also have many manufacturers. One of the great benefits of the Convention is the opportunity it gives all parties of learning the plans, prospects and requirements of the industry, remembering that the nationalised industry ultimately depends on satisfying the customers.

Plant Manufacturers

Capital spent by private industry must be spent well ahead of the Authority's outlay, and so the Authority should disseminate information well in advance of its actual requirements. Manufacturers have taken the first step in overcoming the obstacles of controls and shortages and obtaining plant and equipment. Examining the balance sheet of four large manufacturers, it is found that in the last four years their fixed assets have increased by 94%, so that provided orders are placed with such people, there should be no prolonged difficulties about the supply of plant.



It is a fact that a great amount of plant is in stock awaiting the erection of generating stations, and very serious gaps are developing in the forward programmes of manufacturers.

In the case of boiler makers, the fixed assets are nearly three times what they were four years ago, and there seems strong backing for the statement by them that in 1954 they will be able to offer the Authority an evaporating capacity of 20,000 klb/hr. It is to be hoped that after all this effort the large amount of boilers and plant which can be made available will not be diverted to other people because the B.E.A. has not the power stations or the necessary financial allocations available.

Domestic Appliances

While the heavy plant manufacturers are expanding rapidly, the case of the manufacturer of consuming appliances is far different. There is considerable unemployment and waste of production facilities, and this must also have its effect on the contractor and wholesaler. Assisted purchase schemes would not embarrass the supply authority, as the cooker, for instance, is almost entirely an off-peak load. Moreover, upwards of a quarter million cookers in service are over 15 years old, and they can well be replaced with no rise in demand.

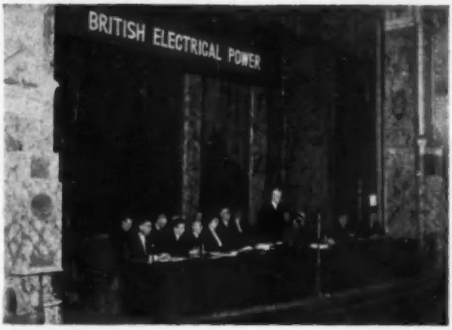
While the B.E.A. and the Area Boards are the main customers of the manufacturers, they are not the only sales outlets for an industry which with £140 million of exports in 1949 was the third largest exporter in the country. The export market must not be forgotten when questions of standardisation arise. Some 500,000 people are employed in the electrical manufacturing industry, but only about 50,000 of these work directly on plant and equipment for the B.E.A. and the Area Boards.

Manufacturers have a particular responsibility in the advancement of their art, and the loose structure and varied pattern of private enterprise is particularly suitable for this creative endeavour. Both brains and money are required for such work: the former are very rare, and we have not discovered how to increase the supply, but money is much simpler, and the question arises whether enough is being spent in industry. On the other hand, such expenditure as is being made has put the knowledge of what can be done well ahead of what has been done.

Concluding, Sir Vincent congratulated the leaders of the supply industry on the way in which they had tackled the great organisational problems which they had to face on nationalisation.

Convention in Camera

Above: Sir Vincent de Ferranti and Lady Citrine signing their names. On right: Lord Citrine opens the proceedings



Above: Mr. J. Eccles is received at the Mayoral reception which took place at the Royal Hall on Monday

Above: The Mayor of Harrogate, Mr. H. H. Mullens (chairman, N.E. Area Board), Lord Citrine, Mr. H. A. Deacon (E.L.M.A. Council), and Mr. W. J. Jones (director of E.L.M.A.)

Above: Part of the audience. On left: Mr. J. D. Peattie, Sir William Walker and Mrs. Watson are seen in conversation

The Economics of Supply

The author discusses the present problems facing the B.E.A. and Area Boards in the field of finance, and forecasts the probable trend of receipts and expenses. He calls for vigorous representation to ensure that the industry suffers only its fair share of capital restrictions

by Sir Henry Self

Deputy Chairman, Administration, British Electricity Authority

CAPITAL cuts imposed by the Government on the supply industry and their attendant dangers were forcibly discussed by SIR HENRY SELF, K.C.B., K.C.M.G., K.B.E., in the paper which he presented to the Convention on Tuesday, under the title, "The Economics of Electricity Supply." The supply industry's claim to a fair share of scarce national resources he said, "matching no more than the relative importance of the contribution it can make, both now and potentially, to the salvation of the national economy, is a strong case, and ought to be stressed to the limit."

Sir Henry commenced his paper with a short review of the history of electrical supply, and went on to discuss the assets, liabilities and duties which the B.E.A. and the Area Boards acquired on vesting day. He continued by discussing supply economics generally, and characterised them by the high—5 to 1—ratio of the capital costs of assets to revenue. At the moment the industry is benefiting by past cheap money policies, but the recent relaxation in this direction may create important problems. Even in the first year of operation, the net burden of capital charges represented more than 23% of the combined revenues. Depreciation accounted for most of this figure (15½%), a straight line method of depreciation computation, based on original cost, being used. These facts make it imperative that a close check is kept on capital expenditure yet a considerable amount of money has to be invested non-productively because of the demands of defence departments and the consideration of public amenities, and of the ideas of planning authorities. The number of available sites for new generating stations is surprisingly small, and sometimes, as at Poole, a disproportionately large expenditure has to be incurred for civil engineering work.

In 1948/49 power generation and transmission to Area Boards accounted for some 60·5% of total expenditure on revenue account, while 36·4% of the money went on distribution costs. The balance, 3·1%, was attributable to general administrative and other expenses. Fuel was the major item, accounting for 65% of the cost of generation as against 54% in 1938. In this respect the supply industry has suffered from the flat rate increases in the price of fuels which took place during the war, regardless of quality. While the price increase for all coals from 1939 to 1948 was 160%, the increase in the cost of coal allocated to generating stations was 183%. Freight charge increases have also raised effective prices, and the most recent advances in cost will incur the Authority in some £1¾ million of extra expenditure. Sea-borne coal-carrying in the Authority's own colliers is one answer being actively pursued, but care is necessary to ensure that a real saving results.

As against this story of increasing prices, it has to be stated that there has been a downward trend in fuel costs per unit s.o., largely as a result of increases in efficiency. However, the cost of distribution seems to be increasing.

Tariffs

In securing the necessary money from the ultimate consumers, the Central Authorities' bulk supply tariff to the Area Boards is an important link, for it introduces the effect of regional fuel costs, otherwise it is a two-part tariff of the conventional kind. The fuel cost clause has the advantage that it keeps electricity charges somewhat in step with those for competing forms of energy. Service charges in respect of the number of points of supply to an Area Board have been excluded to avoid introducing a large number of anomalies.

Probably the next new development in the bulk supply tariff will be the computation of the kilowatt charge with reference to the maximum simultaneous demand of each Area Board.

Retail tariffs are being investigated with the aim of securing rationalisation rather than uniformity—the generalisation of costs over national rather than regional areas must wait. Detailed cost analyses for supplies are not wholly practicable, and regard must be had to the promotional effect of tariffs and to "what the traffic will bear." Moreover, there is the problem of the isolated consumer, especially in rural areas, and here it seems that special contributions towards the cost of supply will be required. Above all this, tariffs must be designed to restrict the peaks and fill the valleys of the load curve.

Financial Prospects

Turning to a broad assessment of the future financial prospects of the industry, Sir Henry envisages a total of 19,500 MW installed capacity by 1955-56 consuming 38 million tons of fuel—improved efficiency accounting for a fuel increase of only 30% with a plant increase of 50%. On this basis, with certain assumptions, the total works cost will fall to 0·480d., compared with 0·552d in 1948-49. Other expenses, except capital charges, may also be expected to decrease in terms of units, and they are estimated at 0·279d./unit as against 0·305. Interest and depreciation charges are expected to rise disproportionately and are estimated to total £90 million. With a sale of 58,500 million units (66,000 million sent out) the total expenditure becomes £275 million—1·128d./unit sold. Income/unit seems likely to fall, at present prices, because of greater consumption by non-industrial consumers, and 1·128d. may well represent the average income for the energy sold—in other words, the B.E.A. will break even.

Criticism of the estimate is easy—the load factor may well worsen, for instance—but it does show that there is no ground for complacency about the future economy of the industry. Unless improvements of various kinds prove the estimate pessimistic, then it may not "be possible to maintain a balance without any serious disturbance of the level of retail tariffs."

Plant Problems

In spite of large orders placed for plant, installation has not kept pace with growth in demand. In consequence, obsolescent plant has had to be kept in service, with consequent uneconomic working. We shall need an annual programme of plant commissioning rising between now and 1965 in excess of 2,000 MW per annum to keep pace with the "free" growth of load and to replace out-of-date plant. This would impose a capital investment that might be disproportionate to the additional revenue to be expected from such an expansion.

Standardisation is one means by which expenditure may be reduced, though care is needed to avoid encouraging it for its own sake. The problem is being studied in collaboration with the manufacturers, and an attempt is being made to secure uniformity of conditions of contract. As a result of these measures and of other discussions there is now a good chance of steady progress towards no load shedding by 1955/56—provided capital "cuts" do not intervene.

Alongside plant expansion, increased transmission capacity is required, and this has been planned—but insufficient capital investment has been allocated by the Government. Yet it is obvious that transmission and distribution should be kept in step with the curtailed programme of generation expansion. Methods of restricting costs by the use of semi-outdoor boilers, larger generating sets and higher transmission voltages are being investigated. Further, discussions are in progress with manufacturers to ensure that construction costs are kept to the minimum.

Efficiency

Efficiency in public enterprise is defined by Sir Henry as "the provision of competent service at minimum cost." This end is being actively pursued in the supply industry, but it is desirable that competition between comparable sections within the industry should be encouraged as an incentive. Comparative tests are required, but differences in territorial characteristics make the framing of these very difficult. Much is expected from the machinery of joint consultation. The public will judge the industry both by financial results and by the service rendered.

Plans for expansion, as already stated, cannot be realised if the capital restrictions proposed by the Government are adhered to: they should be looked at in relationship to the cost to the nation of a fairly widespread stoppage in supply for even one day. Vigorous representation is necessary to ensure that the industry suffers only its fair share of restrictions, and in this respect the relative merits of a short term advantage gained by exporting generating machinery and the long term gain of installing it in this country should be well weighed.

Advances in Lamps and Lighting

Detailed improvements in incandescent filament lamps, big strides in fluorescent development, and the emergence of new forms of discharge lamp are featured in this review of electric lighting advances

by L. J. Davies, M.A., B.Sc., A.M.I.E.E.

Director of Research and Education, B.T.H. Co. Ltd.

RECENT advances in electric lamps and lighting were reviewed by MR. L. J. DAVIES, M.A., B.SC., A.M.I.E.E., (B.T.H.), in a paper which he presented to the conference on Wednesday morning, acting on behalf of the Electric Lamp Manufacturers' Association. No new basic principles of light generation on which lamps can be based have been found, he said, and in practice light is produced by the incandescence of solids, the excitation of gases or vapours, or by the fluorescence of solids. However, the raising of a solid to incandescence by electron bombardment is somewhat new, and so also is the excellence of the "colour" obtainable with a high current density discharge in xenon.

No major changes have taken place, during the last decade, in the highly developed incandescent lamp. The possibility of efficiency increase is small, concerning mainly the suppression of evaporation and the reduction of heat loss by the use of krypton and a higher filling pressure. In miners' lamps, with 4 volt, 1amp filaments, an efficiency of 46 lumens/watt has been obtained by these means.

Tungsten Filament

Glass used in filament stems has, in spite of intensive experiment, remained largely unchanged in composition for the last 30 years. However, recent developments suggest that a new leadless stem glass may soon become popular. Lamp metallurgists have successfully developed sealing wires closely matching the expansion characteristics of all probable glasses. Another component concerning which detailed improvements have been effected is the tungsten filament itself—out-of-roundness can now be checked to within 2×10^{-6} in. by the application of a bridge method.

Some developments have also been made in the shape and surface of bulbs designed to control the polar distribution of light. The high brightness of the incandescent filament necessitates some form of diffusion, and the most efficient method of obtaining this has been found to be a deposit of silica particles on the inner surface of the bulb, which can reduce the maximum brightness to 1·5% of that of a clear glass bulb, with only 5% additional absorption. To control light distribution, mirrors incorporated within the bulbs have been used.

Discharge Lamps

The most notable change of the last decade in the field of discharge lamps is the position now occupied by the tubular fluorescent tube; mercury vapour discharge types have also been developed for a wide range of duties.

In fluorescent lamp design the main characteristic is the operating mercury-vapour pressure, which is controlled by the wall temperature of the lamp, the optimum being about 40° C. In practical lamps some 55% of the input power is converted to u.v. at 2,537 Angstrom. Efficiency increases with increase in tube length and with decrease in tube loading. So far as the second stage of light production is concerned, the conversion of u.v. energy into visible radiation, the optimum light output varies from 36% down to 20% of the input power as the wavelength increases in the range 3,800 A to 7,200 A. However, the luminous energy, not the absolute energy, of the visible radiation has to be considered, because of the variation of eye sensitivity with wavelength. On this basis the maximum possible efficiency is about 150 lumens/watt at 5,600 A (yellow-green) and decreases rapidly on each side of this wavelength. The lumens/watt value for

various more or less "white" lamps varies between 33 and 50, because of the different proportions of the various colours used to produce the white. This last fact has to be remembered when the colour rendering properties of lamps are considered.

Fluorescent lamp efficiency decreases during life due to decrease in the light output from the fluorescent powders. Mercury films are largely responsible for this. Lamp life, however, is being steadily increased, and efficiency is also being improved as a result of phosphor research, these advances being emphasised by comparison of the 1950 and 1940 daylight tubes. The latter had a 2,000-hour life during which the efficiency fell from 40 to 22 lumens/watt, while the modern version starts at about 50 lumens/watt and falls to about 33 after 3,000 hours—and still probably has some 1,000 hours life left after that. A further effect of phosphor research is the abandonment of the medically hazardous beryllium-containing phosphors in favour of the halophosphates.

A final advance in fluorescent lamp technique has been the development of instant-start circuits.

High Brightness Sources

Mercury vapour lamps giving a 10 kW arc in a length of 1 cm have been built, with operating pressures as high as 40 atmospheres, a quartz-containing envelope being used. Experimental lamps have been made in the range 100 to 25,000 watts, but the range mostly used lies between 250 and 5,000 watts. Colour characteristics of the mercury discharge limit the application to some extent, but there have been recent advances towards lamps of sufficiently good colour rendering properties to permit colour films to be taken by their light. This has resulted from the development of a mercury cadmium lamp, the cadmium discharge helping to fill in the gaps in the mercury spectrum. So far pre-focused lamps rated at 5 and 10 kW have been used, with special seals of multiple molybdenum foil, and the new disc and cup seals.

Another high brightness development is the high current density xenon arc lamp, which has 20-30 lumens/watt efficiency, a much greater life than tungsten lamps of corresponding efficiency, and excellent colour properties. The high cost of xenon is a disadvantage which may restrict the application of this type of lamp.

A very specialised form of lamp is the flash for photographic purposes. In addition to the bulb containing crumpled magnesium foil or wire and oxygen, a slug of powdered zirconium is now in use with an oxygen liberating chemical. For repeated use, application is made of the discharge of energy stored in a capacitor, which flashes across a short gas or vapour gap.

Lighting Advances

Illumination provides, either by variations of brightness or colour, contrasts which delineate the pattern of a scene. In any such set-up the light source itself cannot avoid being the brightest source, and the demand for higher levels of illumination combined with the introduction of sources of large area, has made the problem of studying brightness patterns a most important item. In America the idea of discomfort glare factor has been developed in terms of source area, the square of brightness, and "location coefficient" as numerators, with the square of height above eye level and with "surround factor" as denominators. In this country overall rules for avoiding glare have been drawn up. To help in investigating brightness patterns a photographic technique has been developed which secures that the density of silver deposits on a photographic plate or paper are everywhere truly proportional to the relative brightness. By suitable methods of calibration the absolute brightness can be determined from the photograph.

Street lighting presents a problem in glare which has been considerably eased by the introduction of fluorescent lamps suitable for the purpose. In practice, multiple lamp lanterns are used to give the required amount of flux, the lamps and reflectors being enclosed in transparent plastic shields to limit the variation in tube temperature which adversely affects luminous efficiency. Mine lighting techniques can also benefit from the use of fluorescent lamps, and successful trials have been made.

For mines lighting applications a relatively short lamp—not longer than 2 ft—has been used with a rating of 40 W. The usual requirements of electrical safety have been met, and in addition fittings have been designed to withstand very severe mechanical stresses.

Finally, a good example of a combined achievement of both lamp and lighting developments is the application of high power mercury vapour lamps to large high-bay factories of the type used for steel production, the manufacture of bulky electrical equipment and the rolling of metal sheet. The effective concentration of six 400-watt mercury vapour lamps into one 2½ kW lamp operating horizontally in a trough-shaped aluminium reflector has greatly eased the problem. For colour improvement the practice is to incorporate two normal 1½ kW tungsten lamps with each m.v. unit.

The B.E.A. Conference

General Situation of the Authority Reviewed

SPEAKING at the B.E.A. Conference held at Harrogate on Monday, Lord Citrine gave a general review of the progress of the British Electricity Authority. He stated that he held the view that the Electricity Boards were fully capable of taking any necessary measures to ensure efficiency and that it was an obligation of the Central Authority to institute an internal examination of the functioning of the organisation. A Select Committee as suggested, to investigate these matters, was therefore unnecessary.

On the financial side, the Area Boards had made a gross profit of £4,998,833, whereas the Central Authority showed a deficit of £607,149. It was expected that a similar deficit would occur for the year ending March, 1950, but in subsequent years a profit was expected.

The growth of demand still provided the greatest difficulty; consumers had increased by about 90,000 since vesting date. The maximum load actually carried during the winter of 1949/50 was 11,022 MW as compared with 9,501 MW in the last winter before vesting date. The engineering staff were to be congratulated on achieving an increase in thermal efficiency. Shortage of boiler plant was the main difficulty in new stations. Turbo-alternator production was satisfactory.

Labour relations were, generally, satisfactory although forces were at work to frustrate the efforts being made to establish goodwill and understanding. Lord Citrine then gave a brief review of the work of the N.J.I.C., the N.J.B., the N.J.C. and the machinery for managerial grades. It was anticipated that a managerial council would be established, divided into six panels: the Association of Managerial Electrical Executive having exclusive representations on the managerial panel and the E.P.E.A. having exclusive membership on the panel of Power Station Superintendents.

Finally, he referred to the Electricity Supply Research Council which had been set up, and concluded with thanks to members of the Area Boards, officials and staffs for the loyal service they had rendered to the industry.

Load Shedding

Sir John Hacking had some pertinent remarks to make on the problem of load shedding. Due to Government limitations on the capacity of new plant to be commissioned in any one year we should not be in a position to meet all demands for at least another five or six years. The position during the coming winter was likely to be little less critical under severe weather conditions than it has been in the past. Under average conditions, however, we might reasonably expect to have sufficient plant available in 1954 to meet the total load on the system.

The only immediate solution to the problem appeared to be the modification where necessary of the supply tariffs so that low load-factor demands bore their full share of the kW cost involved and were thereby discouraged.

In conclusion, Sir John said that the only real solution was the provision of new capacity and the B.E.A. was making all efforts to accomplish this. "It would be unfortunate indeed if these efforts were to be largely nullified by any decision of the Government to reduce, for economic reasons, the amount of plant to be commissioned in any year below the maximum capacity which could in fact be installed."

Commercial Trading

Mr. E. R. Wilkinson, commercial manager, B.E.A., dealt with the general trade situation, particularly as the two organisations, gas and electricity, were concerned. While agreeing that the consumer should have freedom of choice, he also considered that clear and correct information should be given to the consumer. He suggested that the competition between gas and electricity should be restricted by relating prices to production costs and eliminating subsidies culled from appliance sales, hiring, etc., and proposed that only honest, and not derogatory, propaganda should be used. He then surveyed some of the claims made by the gas industry in a highly critical manner and concluded that the time had now come for the electrical industry to attack on a competitive basis instead of remaining passive, and to go out for the cooking and water heating load.

He also considered that there should be no reason of national interest to impede the electricity supply industry in making the most strenuous efforts in competition, and said that we should fight hard, though fairly, making no exaggerated claim, but confidently asserting the advantages of the electrical way of life.

22 JUNE, 1950

Scenes at Harrogate

Above: Messrs. D. T. Leathword, J. Jameson, J. Sullivan, J. N. Waite, A. Sturgess

Right (left to right): Messrs. R. H. Harral, E. R. Wilkinson, A. Heaton, J. E. Shepherd and Ald. Rhodes

Left: More personalities: G. F. Moore, C. H. A. Collyns, J. F. Field, G. H. Sankey, Councillor H. Preece

Left: Mr. L. A. Muir explains the new Parnall washing machine to Sir Vincent de Ferranti, Lady Citrine and Mr. E.R. Wilkinson

Below: Mayor of Harrogate, Sir Vincent de Ferranti, V. W. Dale and Lord Citrine peruse EDA's filing cabinets

Below: Sir Vincent examines the latest B.N.E. cooker

Background of the President

Sir Vincent de Ferranti, President of the Council of the British Electrical Power Convention and one of the most distinguished figures in the Electrical Industry, has had a wide and varied technical career. Below we give some salient details of the President's background

FOR many years it has been customary on the occasion of the I.M.E.A. annual Convention for us to print a short historical review of the undertaking or Company within whose area the Convention was being held. Under the nationalised scheme of things, however, this course has now become impracticable, and we are therefore giving a brief review of the firm of Ferranti Ltd., and of the career of this year's President of the Council of the B.E.P.C., Sir Vincent de Ferranti.

Early Beginnings

The firm of Ferranti, Ltd., owes its inception to Dr. S. Z. de Ferranti, whose place in the forefront of the ranks of electrical engineers is assured by his great technical contributions at a time when the Supply Industry was in its infancy. It was in 1882 that the first Company came into existence under the name of Ferranti, Thompson and Ince, Ltd. This firm was, however, short lived, and went into liquidation at the end of 1883. Ferranti bought back his patents, formed his own company, and so founded the present firm of Ferranti Ltd.

Due to his great technical ability, Ferranti was soon able to pursue some of the most far-reaching schemes of the time. Grosvenor Galley, Deptford and Bankside are among a few of the early stations which paved the way for the electrical progress with which the name of the pioneer will ever be associated.

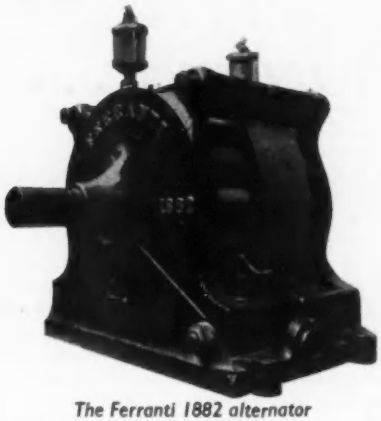
By 1904 the Ferranti works had moved to its present site at Hollinwood and has continued on that site until the present day.

In 1890, Ferranti Ltd. manufactured 10,000 volt transformers of such reliability that they were still in use 33 years after. Since that date many notable advances have been made in transformer design. In 1924, transformers with forced oil circulation through windings arranged for fully directional oil flow were introduced. Much work was also done on surge stress control. The problems of producing high voltage testing equipment for research laboratories were faced and overcome, and many Ferranti installations are in use in cable and other works requiring high voltage testing. Although in the early days a considerable amount of generating plant—both turbines and alternators—was produced, the march of events led to the gradual dropping of this equipment in favour of transformers, meters, domestic appliances, and radio and television equipment. The switchgear side of the organisation was taken over by Ferguson Pailin Ltd.

Sir Vincent's Career

Much of the credit for the modern construction and organisation of the Company is due to the present Chairman and Managing Director, Sir Vincent de Ferranti, Past President of the Institution of Electrical Engineers.

Born in Chelsea on February 16, 1893, and educated at Repton under Dr. Temple (later Archbishop of Canterbury), Sir Vincent early showed a similar trend towards scientific matters to that evinced by his father. At school he won the School Science Prize and also represented Repton as a gymnast in the Inter-Public Schools Contest. His introduction to heavy engineering was at Yarrows of Scotstoun, where his apprenticeship was spent, chiefly on the building of destroyers for H.M. Navy. With the outbreak of war, at 21 years of age, he joined the Royal Engineers as a commissioned officer and served with them in Gallipoli at Suvla Bay from the landing to th-



The Ferranti 1882 alternator

evacuation, and later with the Salonica forces in the Struma and the Vardar Valleys. During this period he obtained the rank of Captain, and was awarded the Military Cross.

Upon the return of peace he entered the works at Hollinwood and was for a while engaged in research and experimental work, particularly in connection with reversing regenerator engines and boilers. In 1921 he was appointed manager of the Transformer Department where, under his guidance, a series of outstanding developments took place. The first 110 kV transformers to be built in this country were made and shipped to New Zealand; new high voltage laboratories were established and, in 1924, these laboratories produced for the first time in Britain an arc of one million volts.

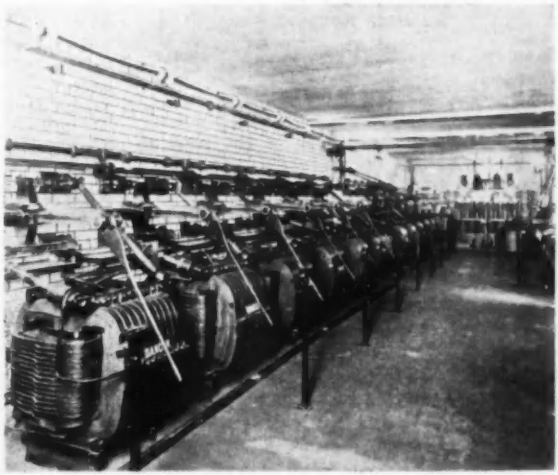
Sir Vincent was always a keen advocate of the three-phase unit, as opposed to three single-phase transformers for large electrical power systems, and it is probable that his ideas had some influence on the Central Electricity Board in their adoption of this practice when the Grid System was erected.

The need for developing overseas markets had already been visualised, and in 1924 Sir Vincent was made a Director of the Company, and in the same year set out on a six months world tour to study conditions in Canada, New Zealand, Australia, and South Africa.

The forthcoming expansion of domestic and commercial radio had also been seen, and in 1926 Sir Vincent opened a new factory in New York mainly for the production of radio components. About this time he was occupied with plans for the removal of the Canadian Ferranti works from Noble Street in Toronto to a new site at Mount Dennis, and for a complete reorganisation of the Company's activities in Canada.

Dr. Ferranti died in January, 1930, and Sir Vincent succeeded to the Chairmanship. In the next few years he was much engaged in a programme of radio expansion. More accommodation was required for the making of valves and the building of radio receivers, and 1934 saw the opening of a large new radio factory at Moston. These premises had subsequently to be enlarged three times due to the pressure of Government orders. Other factories and dispersal units had to be established during the war, including the present works at Crewe Toll, Edinburgh, where Ferranti Ltd. became the parent firm engaged in making the gyro gun-sight.

Sir Vincent went to France in 1939 as a Major in command of a Field Company of the Royal Engineers but, after the evacuation, was recalled to take personal charge of the direction of the war activities of the firm. Like his father before him, he became President of the Institution of Electrical Engineers, in 1946. He is also a Vice-President of B.E.A.M.A. and was Chairman of that body in 1938-9, after serving as a member of the Council since 1930. He has also been closely identified with the work of the World Power Conference and with the International High Tension Conference. In 1948 he received his knighthood.



Early Ferranti switchgear and transformers

Our readers' views . . .

Battery Operated Welders

REFERRING to Mr. Currie's letter and your footnote to it in your issue of April 20, suggesting something on the lines of an "Ilgner" motor generator set for welding, it is true that generators are used for some types of welding. It might be considered, however, whether the speed of response from such an equipment would be adequate for the requirements of heavy resistance spot welding or flash butt welding of aluminium alloy sections.

Where carefully timed peaks of 20,000 to 100,000 amperes for a fraction of a second are necessary, the relative freedom from inductance of a carefully designed battery circuit might be a point of importance.

Incidentally, it might be of interest to note that batteries of the type used for "LL" minesweeping were actually used in the American welding equipment mentioned in my article. These were first produced in Britain during the war, and later in U.S.A. These were of a rather light construction and would not necessarily be the best type for use in a comprehensively designed battery-rectifier welding equipment.

E. R. Sanderson

CHLORIDE BATTERIES LTD.

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Radiant Boiling Plates

YOUR reader's caution on the advisability of installing radiant "surface units" in place of the more usual (in Britain) solid type, tempts me to add a comment or two in favour of the responsive radiant coils.

The fact that the solid plate is now virtually obsolete in the United States—a country where practical economics are outstanding—should make us even more alert to the convenience and all-round economy of the radiant type, not resistant to it.

Both in teaching practice, and in my own home—for many years now—I have enjoyed using circular radiant units under "Simmerstat" control, and I can assure Mr. Brookman that never once has the milk saucepan misbehaved (on No. 1 Sim/stat). When unexpected delays, such as prolonged telephone calls, occur, I can say these units develop "absent control" to a fine art!

While the use of a radiant coil as grill boiler may not prove to be quite so satisfactory as the solid type (reflection factors and the possibility of spillages come in here), many people still prefer to use them. But with the fitting of a solid top plate for the grill alone, there is a useful second string, and provided the base of the lighter-type saucepan is reasonably flat, full value is assured (certainly there is no need to keep two sets of pans).

I would remind your reader that the grill boiler, from the surface heating standpoint, is entirely second-place in importance, first demands inevitably being made on the circular plates. It is to these the housewife most frequently turns, and here material economies are immediately felt.

To Mr. Brookman I would say: start in with radiant plates, and find a new flexibility in electric cooker control!

Mary Gilbert

HAMPSTEAD

AS pioneers in this country of the radiant (tubular sheathed element) boiling plate and grill boiler sold under the name of "Redring," we were very interested in Mr. Brookman's letter in your June 8 issue. The main arguments in favour of the radiant plate are as he has stated and he need have no fears regarding mechanical reliability. In addition the high efficiency of the plate is maintained throughout its life, and the visible red glow is very satisfying to the user.

The radiant grill boiler is a genuine two-purpose plate which, when correctly used with a reversible reflector, gives excellent grilling facilities, and also serves as a radiant boiling plate with an efficiency of the same high order as the standard radiant boiling ring.

In view of the fact that the most used items on any cooker are the boiling rings and griller, it is surely worthwhile paying a little more in the first place for these items to obtain the best possible cooking facilities.

H. S. Carter

METROPOLITAN-VICKERS ELECTRICAL CO., LTD.

I AM interested in Mr. Brookman's letter regarding radiant plates. For my part I always think that this question cannot be answered until one knows what cooking has to be done and the size of the family one is cooking for. Radiant hotplates, for the small quantities more common with the family of three to four people, are certainly quicker, but for large quantities (a quart or more), provided a flat bottom pan is used, the solid type boiling plate is more speedy.

It is my experience that the average household only occasionally requires to boil large quantities, and for that reason I usually recommend the radiant plate which boils the more usual quantities of anything from a gill to a pint quickly. In addition, there is the psychological value of a plate that one can *see* is hot. Heat that you can see always appears more efficient!

If it has simmerstat control, so much the better, as there is greater heat variation.

The small hotplate is usually employed as a simmering plate for cooking, which requires long stretches of slow heat. Such cooking is frequently in large quantities (like the stock pot or the boiled fowl), and I find that a solid plate in this position is better.

With regard to Mr. Brookman's enquiry about a radiant grill boiler, I have had experience of such a grill on a small cooker. While it is effective, it is also slow and one has to wait a considerable time before it is red enough for toasting, while the heat losses appear to me to be greater than they are on those cookers that have a fireclay-embedded grill covered with a solid sheet of metal. For boiling, neither type of grill is as efficient as a boiling plate where the entire heat is concentrated upwards, and this is to be expected, but I think Mr. Brookman will find that he will have the best results from the normal type grill fitted to modern electric cookers. Simmerstat control on a grill is, in my opinion, unnecessary, as one always requires a bright red heat and regulation is obtained by moving the food closer to or farther from the heat. Most grills, at medium, simply cut out alternate bars of the elements, thus still maintaining a radiant heat. Low heat is intended for keeping food hot rather than for actual cooking.

Unless Mr. Brookman is catering for a family of eight or more, in which case I would recommend all solid plates, I would suggest he has a cooker with an 8-in. radiant plate, simmerstat-controlled, a small solid plate, also simmerstat-controlled, and a solid-topped grill with three-heat switch.

Joan Whitgift

EARL'S COURT

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Squirrel-cage Motors

I SHOULD like to congratulate the author of "Squirrel-cage or Slip-ring Motors," in your June 1 issue, on an admirable exposition of the case for the direct-on-line-started squirrel-cage motor. The regulations made by British supply authorities impose, even today, far more stringent restrictions on the current which may be momentarily taken by a starting motor than are found necessary on the Continent or in the U.S.A.; the survival of such archaic restrictions in these days of interconnected supply systems has been largely responsible for retarding the development of the inherently simple, reliable, and efficient squirrel cage machine.

On a point of detail, however, may I remind the author that it is quite usual in the ordinary double-cage machine to employ only half as many slots in the inner cage as in the outer. Excessive saturation at the roots of the rotor teeth (mentioned on p. 902) is thus avoided, and at the same time the "mutual' leakage between the inner and outer cages is greatly reduced, with a consequent improvement in performance. The halving of the number of inner-cage slots reduces the radial depth of the connecting slit between the two cages, and thus still further reduces the tooth saturation.

The automatic m.m.f. balance round the periphery of the rotor is scarcely affected by this arrangement. The number of slots in the outer cage is normally a maximum (dictated either by mechanical considerations or by the maintenance of a proper ratio of rotor/stator slot numbers) and with the resistance ratios normally used the outer cage carries (in spite of a very general impression to the contrary) a far from negligible proportion of the total secondary current so that conditions are but little different from those obtaining in an ordinary squirrel-cage machine. Pitched *outer-cage* windings can, however, be employed if desired, a bar above an inner cage slot being connected in series with one not affected by the inner-cage current.

D. R. N. Seed

LONDON

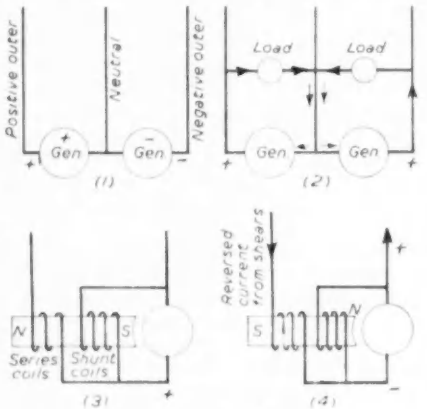
Problems and Practice

IN ENGINEERING

Trip Generator Before Prime Mover

THE engineer of an industrial plant reported what at first appeared to be a fault of an unusual nature. The plant was a small one of 50 kW, comprising an a.c. motor as a driving member with shaft extension on both ends, and each extension coupled to a 25 kW, d.c., 250 V compound-wound generator. The generating side was arranged on a three-wire system—500 V on the outer, 250 V between each outer and neutral; just a simple three-wire supply, no rotary or static balancers. The complaint was—all 500-V motors appeared to be running at slightly over half speed. The 250-V motors were operating normally. The voltmeter on the negative generator read zero. A lamp test, however, applied to each machine in turn indicated full glow. Obviously, the polarity of the negative generator had reversed, and the voltmeter needle hard on the stop pin gave a zero reading impression.

The cause of the reversal was traced to a set of plate shears driven by a 250-V motor. These shears had a fairly heavy fly-wheel—hence considerable stored energy. On shutting down at



Current flow and polarities in the shears before and after reversal

the generating end, the operator tripped the a.c. driving motor with the generating and shear switches closed. The shears motor, due to the fly-wheel storage, functioned as a generator, the current flowing through the series windings of the generator in the opposite direction, thereby reversing the magnetic polarity of the field poles. On starting up again on reversed residual poles, the polarity of the generator was reversed. Fortunately, no attempt was made to operate the plant for any length of time, otherwise the neutral feeder would have been seriously overloaded. In place of handling the out of balance current, the neutral would have been called upon to carry the return current of the positive and negative outers.

The manner in which the reversed polarity was corrected was as follows: The set was started up and the polarity of the field terminals of the reversed generator checked up. Let us assume terminal designated A is the positive, and B the negative. Test polarity of the other generator or across the line or supply terminals and mark these A and B. Shut down, disconnect link between armature and field terminals of reversed machine, connect a lead from terminal A of other generator to field terminal B of reversed machine. Connect other lead from terminal B of the sound machine to terminal A of reversed generator. Start set up and when the voltage of the positive (or unreversed machine) has built up (generated) shut down. The polarity of the reversed generator is now corrected. Reconnect disconnected field links of negative machine. This method of exciting avoids high inductive action and possible damage to the insulation of the field coils, if the circuit was opened under current-carrying conditions. To prevent a recurrence of reversal, the operator was advised to open his generator switches before tripping the a.c. motor.—*F. Mackintosh.*

Conduit Shock

DURING the course of rewiring an hotel at Faversham, I had cause to rectify the following fault.

We had only been on the job about four days, when one of the electricians received a slight shock, between some lead covered cable and our new screwed aluminium installation. As the old installation was in very bad shape, we decided that the lead cable must have been

poorly earthed and that the insulation was perished, therefore a slight leak was the cause. The next day the lead cables were unclipped so as to make way for the screwed conduit. These cables were still supplying some lighting circuits. The electrician supported the lead cables on the conduit, whereupon, when they were lifted off again, a slight spark occurred, no further notice was taken. The supply at the hotel was 460 V d.c. 3-wire system. The next time the lead cables were moved there was quite a large arc between the conduit and the lead cable so we decided to find the fault.

Upon withdrawing the fuses supplying these cables the arc still remained, until the fuses supplying a 15 amp 3 pin all insulated switchplug were drawn. The switchplug was traced to the public bar and was supplying a 2 kW convector. When the convector was switched off from the switchplug the arc ceased, so we at once suspected the convector. The convector was checked and found o.k. so the switchplug was removed. It was not of the hollow back type and had been installed flush on to a brick wall and the earth wire was touching on the neutral. The earth wire was traced to the lead lighting cable and as the lead was not earthed and our conduit was earthed to a water main, when the fire was in use a proportion of the 2 kW was returning to earth through our screwed conduit. The reason why the electrician received a shock in the first place was that owing to the out of balance on the supply mains a proportion was returning to the power station through the water main.—*J. T. Skinner.*

Fault on a Single-phase Fan Motor

I WAS recently called to inspect a six-pole capacitor run motor of fractional horsepower size driving a small fan used for blowing hot air into a workshop. The fuses had blown and so were replaced and the motor switched on, when the fuses blew again. This immediately suggested trouble on the motor or its circuit wiring, so both were tested but found to be sound.

When making inquiries, the foreman of the department said that the fan had run satisfactorily although it seemed to be running slower before it had finally stopped. The motor was then returned to the workshop for further tests.

Here it was stripped, the bearings which were of the sleeve type appeared to be good and there was no sign of a seizure. The windings were then examined and tested, both for "shorts" and earths, and no faults showed up. Suspecting a reversed coil, they were checked for polarity and found correct. The motor was reassembled minus the fan blades, and connected up with a pair of fuses in circuit. When the motor was switched on, it tried to start, but only hummed and the fuses again blew. The windings were checked for continuity and the condenser tested, and were both in order.

The rotor was then suspected, so it was removed and examined. It was noticed that the end-rings and the rotor bars had only been hammered together, so it was decided to braze these connections and try the motor again.

This time the motor ran but only at a reduced speed of 265 r.p.m. instead of 965 r.p.m. as marked on the name plate, and heating occurred after about five minutes running. More brazing was tried and the motor then ran satisfactorily and at the correct speed. The satisfactory running when the motor was first installed was due to the bars and the end-rings making good contact, but due to vibration, possibly due to some slight out of balance, the joints were loosened, causing heating and oxidising and more heating, the whole effect being accumulative, finally causing the motor to stop altogether. This job serves to emphasise the need for decent connections between the rotor bars and the copper end-rings, and it is well to examine this point if similar faults are found in other types of small motors of this pattern.—*A. R. G.*

Artificial Coal

REPAIRING the "coal" on artificial coal electric fires is a fairly simple matter, provided that no large pieces are missing, to carry out at home. I have repaired one of our fires after the leg of a chair had been put right through the artificial coal.

Proceed as follows. First fix the pieces into place by putting a piece of thin rag underneath and glueing with Durofix. When this is dry take small wisps of cotton wool and soak them thoroughly in Gloy; then paint the cracks with Gloy on the outside and work the cotton wool into the cracks and into any small holes until they are filled up. When this Gloy-saturated cotton wool is dry it sets hard, almost like cement. Finally paint over the parts which are supposed to be black with cylinder black, putting the paint on the outside. Cylinder black is a black paint which is sold for motorcycle engines, etc.—*P. G. C. Wilding.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

overseas news

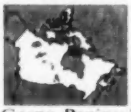
A Plea from Newcastle

In view of the increasing demand for electricity, the Newcastle City Council, N.S.W., is to make representations to Mr. Conde, chairman of the newly formed Electricity Commission, to re-open the question of the construction of a new power station at Newcastle. Ald. Quinlan, the Lord Mayor, has pointed out that as far back as 1941 the City Council tried to get permission to erect its own power station. At that time, British experts who had investigated the possibilities of a local power-house, had been of the opinion that it should be located close to the main load. Carrington was recommended as the ideal site, because it was surrounded by natural waterways and was close to the heavy industries. It had been proposed at that time that the council should erect its own power-house costing about £6,000,000. The Government, however, turned down the proposal, claiming that it was a Government responsibility, and had later proposed the Wangi project. The Council is also urging electrification of the main line to Sydney and of the suburban lines.

Butler's Gorge

Installation of the second regulating valve and the main valve controlling the flow of water to the power station at Butler's Gorge, has been completed, it was stated recently. Water for the winter could now be stored at Clark dam. The steel frame of the power station building has been erected, and the installation of the generating set will commence shortly. Every effort is being made to get the unit into operation by the end of the year.

Copper Deposits



In Quebec a few days ago, Premier Duplessis announced that important deposits of copper ore, located about 30 miles from Madeleine, near the tip of the Gaspe Peninsula, would be exploited by Gaspe Copper Mines, Ltd. To date, 40 million tons of copper ore had been proved, he said. The exploitation of these sources would make necessary the construction of a dam and a power plant which would be built on the Madeleine River. It would also be necessary to build a road into the mining area for the transportation of the raw ore to the St. Lawrence (Gulf) shore from where it would be shipped to its ultimate destination. Construction of a copper ore refining plant near the development was under serious consideration, it is understood.

New Brunswick Development

As a first step in an expanding provincial hydro-electric programme, a 20,000 h.p. generating station is to be built on the Tobique River at the Narrows, just above Perth, the Premier of New Brunswick, Mr. J. B. McNair, announced a few days ago. It is expected that construction work will commence this summer. The project will involve the building of a dam across the Tobique River, and smaller dams at the outlets of Trousers, Sisson Serpentine, and Long Lakes, in Victoria County, for water storage purposes. A more detailed survey is to be undertaken immediately, and Dr. T. H. Hogg, former chairman of the Hydro-Electric Power Commission of Ontario, has been retained as consulting engineer. Power from the scheme will be primarily to meet the needs of the northern part of the Province, but the development will be linked with the New Brunswick Electric Power Commission's grid system. The estimated cost of the Tobique development, $5,600,000, is the equivalent of $280 per installed h.p. In recent years the cost of large hydro developments in Ontario and Quebec has approximated $200 per h.p., while that of smaller developments has been as high as $300, we understand. Tobique will be the first water-power development of the Power Commission since the Musquash plant was erected 30 years ago.

Italian Electrification

Last month saw the inauguration of a further portion of the 149-mile single track Rome to Pescara main railway line—the Avezzano-Sulmona section amounting to 40¾ miles. The 67 miles of line between Rome and Avezzano was electrified before the war, it being one of the first lines in Italy to be converted to the 3,000 V d.c. working. The electrification completed now extends electric traction over the most difficult section of the whole line, running eastwards from Avezzano through the Abruzzi range of the Apennines. The summit of the line, at 2,939 ft., is reached at Carrito-Ortona. Earlier work on the section was wrecked by the Germans.

Mysore Scheme

A programme for the expansion of the electrical goods industry in the Mysore State, spread over five years, is under consideration. An American firm has submitted a scheme in this connection, after surveying the possibilities of development in the Government porcelain electric factories and Mysore lamp works. Estimated cost of the scheme is Rs. 100 million.

Pakistan Production

Generally considered Pakistan's largest lamp manufacturing concern, P. Hyesons Ltd. will shortly begin manufacturing fluorescent street lighting and vapour discharge lamps in technical collaboration with a European firm of electric lamp manufacturers. Production capacity of the new plant, shortly to be set up in Karachi, is expected to assure the bulk export of electric lamps to the Middle East.

Geothermic Tests in N.Z.

Some 250 bores had been drilled in the Rotorua district during the investigation of the possibility of geothermic power, Mr. J. Healy, a New Zealand Government geologist, told the Waikato Scientific Association a few days ago. He said that superheated water had been tapped but 90% of it was at the level of the normal water table, being rain water which had been heated by gases from below and not water which had been crystallised from the magma, the molten material from the centre of the earth. However, deeper wells had been drilled and these had reached the genuine water of crystallisation. To exhaust the water supply, it would first be necessary to exhaust Rotorua Lake, but at present they were endeavouring to find out whether the deeper sources of supply would dry up if tapped to any great extent. He emphasised that one of the biggest difficulties at Rotorua was the fact that the acidic nature of the earth attacked, from the outside, the pipes used for the drilling, and the alkalis contained in the water which was tapped caused a deposit of solids on the inside of the pipes, usually resulting in a blockage. Ways and means to offset that trouble were being investigated. When once it had been decided to utilise the steam for the generation of power, the acidic nature of the water would again prove a difficulty, said Mr. Healy, but there were two ways of overcoming that. It could be done either by using the heat and not the steam, a process involving the transference or conduction of the heat, or by evolving special non-corrosive alloys with which to construct the turbines and conveying pipes. In Italy, both methods were used.

Auckland Proposal

Preliminary decisions which may have far reaching effects on future power supply to certain consumers of the Auckland Electric-Power Board, N.Z., were made at a meeting of the Board earlier this month. The public relations and power supply committee of the board was instructed to review the policy for new business, and a recommendation was adopted that commercial and industrial consumption be subjected to the strictest control through the present and future emergency. It was pointed out that a commercial undertaking was usually granted an increased quota, whereas domestic consumers were told they would have to manage within their allocation.

New Station for S.A.

A new generating station is to be erected near Coalbrooke, in the Orange Free State, by the Electricity Supply Commission of South Africa, it is announced. To be known as the Taaibos station, it will house some of the largest generating plant in the Union, and will eventually cost about £20,000,000. Designed by the Commission's engineering staff, it is expected to be in operation in about four years. Orders have already been placed for the first four generators, each of 60 MW capacity, and four 580,000 lb/hr boilers, together with some other equipment. Ultimately the station will contain seven generating sets and possibly eight boilers when fully equipped. Mr. A. M. Jacobs, chairman of the Commission, has stated that the Taaibos station would be a coal pithead station, situated near the Clydesdale colliery which had reserves of more than 20 million tons of coal. The station would provide power to the Reef, where considerable load development was expected. To avoid the restricted clearances of tunnels in the Natal Main railway line, the heavy plant for the station would be landed at Port Elizabeth.

Bloemfontein Extending

Proposals for supplying Brandfort with electricity from the Bloemfontein municipal power station were discussed at a recent meeting of the Bloemfontein City Council. The Bloemfontein Electricity Committee has also suggested that a previous resolution by the Council not to undertake electricity extensions beyond the municipal boundary should be rescinded and that extensions to such areas should be proceeded with.

Durban's Problem

A suggested cut of £2,500,000 in capital expenditure during the financial year 1950-51 by the Durban City Council is causing particular concern to the Electricity Department, whose apportionment of the sum would be £250,000. Mr. C. Kinsman, city electrical engineer, has said that to reduce the estimates by £250,000 would seriously jeopardise the Electricity Department's ability to meet the growing industrial, commercial and domestic demands being made upon it. It would also hasten the steadily mounting risk of serious breakdowns and damage to plant and cables due to overloading. If his department was compelled to cut by such an amount, he feared it may even be necessary either to refuse to make new connections, or to embark upon a scheme of rationing of electricity in certain areas.

C.P. Expansion

The Warrenton Municipality, Cape Province, is proceeding with the extension of its electricity supply undertaking, and it is understood that when the work now in hand is completed, the station's output will be doubled.

PERSONALITIES

IN THE INDUSTRY

Until recently senior illuminating engineer to Troughton and Young Ltd., **Mr. C. J. Misselbrook,** B.SC.(Eng.), F.I.E.S., has rejoined Siemen's Electric Lamps and Supplies Ltd. as manager of their Illuminating Engineering Department, succeeding **Mr. W. F. Griffiths** who is now with Crompton Parkinson, as we reported last week. Mr. Misselbrook was educated at St. Olave's Grammar School, receiving technical training at Northampton Polytechnic. He served with Holophane Ltd. from 1935 to 1937, when he joined the Siemens organisation, with whom he spent 11 years before going to Troughton and Young. He has contributed a number of articles on lighting matters to the ELECTRICAL TIMES.

Mr. C. J. Misselbrook

Prof. Philip B. Moon has been appointed Poynting Professor of Physics and director of the Department of Physics at Birmingham University, in succession to **Prof. M. L. E. Oliphant,** who is returning to Australia next month.

The Uganda Electricity Board has appointed **Mr. J. M. Stock,** M.ENG., M.I.MECH.E., M.I.E.E., as chief electrical engineer. A graduate of the University of Liverpool, he served an apprenticeship with the British Thomson-Houston Co., Ltd. After 18 months with the Liverpool Electric Cable Co., Ltd., he went to the Argentine where he served with the Buenos Aires and Pacific Railway Co., Ltd., and later with the Cia. Interprovincial de Servicios Publicos and the Cia. de Electricidad del Sud Argentino. Returning to the U.K. in 1934, he joined the Yorkshire Electric Power Co. as a district engineer, and four years later became chief electrical and mechanical engineer of the Public Works Department in Palestine. In 1946 he transferred to Nigeria as senior electrical engineer and later deputy electrical engineer-in-chief of the Government electricity undertakings. Retiring from the Colonial Service last year, he was appointed deputy chief electrical engineer to the Uganda Electricity Board.

Mr. D. Sullivan, sales manager of De La Rue Extrusions, Ltd., was presented with the British Plastics Trophy at the Plastics Industry Golfing Society dinner recently.

Mr. G. I. Payne, ASSOC.I.E.E., A.INST.P., director of Tuscan Engineering Co. Ltd., has been elected a member of the South Wales Executive Committee of the Industrial Association of Wales and Monmouthshire.

The new publicity manager of the Skefko Ball Bearing Co. Ltd. is **Mr. G. L. Wareham,** who was formerly chief assistant to the publicity manager of Marconi's Wireless Telegraph Co. Ltd.

In the reorganisation of the English Electric Co.'s Traction Department, Bradford, and Rolling Stock Department, Preston, **Mr. C. R. Parker** is now manager of the Traction Department. **Mr. P. L. Mardis** has relinquished his executive position as chief engineer and technical manager, Traction Department, and has been appointed whole-time traction consultant, located at Bradford, for special duties in association with the chief engineer. **Mr. W. G. Jowett,** in succession to Mr. Mardis, is now chief engineer, Traction Department.

Last month saw the completion by **Sir Arthur Fleming,** C.B.E., D.ENG., of fifty years of service with the British Westinghouse and Metropolitan-Vickers Electrical Co., Ltd. He is believed to hold the record for length of service with these companies, and he is the only remaining member of that early group (known as the Holy Forty) who went to the U.S.A., still with the company.

Formerly consumers' engineer at Maidenhead, **Mr. A. G. Whitehorne,** A.M.I.E.E., has now taken up duties as district commercial officer at Basingstoke, Southern Electricity Board.

The end of this month sees the retirement of another well-known publicity manager in the industry—**Mr. J. Taffs,** who has held that position with the English Electric Co. Ltd. since 1933. He started with the old Dick Kerr Co. in 1905, transferring to the publicity department in 1913, when he became advertising manager. After war service he returned to what had become the English Electric Co. and was appointed advertising manager in 1922. For a period he held the office of joint publicity manager with the late Mr. H. W. Kefford, becoming manager of the publicity department in 1933. Mr. Taffs has served on many bodies concerned with engineering publicity. On his retirement he relinquishes the chairmanship of the B.E.A.M.A. Publicity Committee, of which he has been a member since its inception in 1924. He plans to take a month's holiday in Italy, returning to take up consultative appointments in connection with engineering and other publicity matters.

Mr. J. Taffs

Last week **Mr. F. A. W. Payne,** chairman, and **Mr. C. H. Bennett,** sales director, of Ega Electric Ltd., flew to America, principally in connection with a proposal to complete negotiations for the manufacture under licence of the firm's new spray gun, we understand.

Three changes of personnel have been made in the Radio Department of the General Electric Co., Ltd. **Mr. W. A. C. Maskell** who has been assistant manager for four years is now deputy manager. **Mr. R. G. E. Mayo** is now assistant manager (broadcasting) and **Mr. A. E. Potton** is assistant manager (batteries). Management of the department is still the responsibility of **Mr. M. M. MacQueen.**

Mr. B. Hallows Garside, M.I.E.E., has resigned his position of managing director of the Britannic Electric Cable and Construction Co., Ltd.

As manager of their new Aberdeen branch, Brook Motors Ltd. have appointed **Mr. W. J. Ward,** formerly of the Sheffield branch. He had earlier been connected with the firm's Glasgow office. In place of Mr. Ward, **Mr. Brailsford Sykes,** A.M.I.E.E., previously of the Liverpool office, has been nominated assistant sales engineer at Sheffield.

For the position of resident mechanical and electrical engineer for the Cyprus central electrification scheme, **Mr. T. W. Parker,** Assoc.I.E.E., M.Inst.F., has been selected. He resigned from the post of station superintendent to the Calcutta Electric Supply Corporation in 1948, owing to a breakdown in health after serving that company for 19 years. His early experience was gained at Preston, first as a pupil under Mr. J. F. Simpson, the borough electrical engineer, and later at the Tramways power station, and as charge engineer at the Ribble station. Mr. Parker, who takes up his new duties early next month, will supervise the installation of plant in a new thermal power station at Dekhelia, and the construction of 163 miles of 66 kV and 63 miles of 11 kV o.h. transmission system in the island.

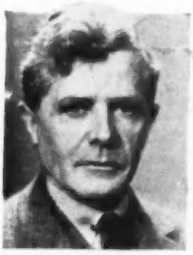
The General Electric Co. Ltd. has appointed **Mr. W. J. Bird** as sales manager for the London area, which includes responsibility for the company's branches at Ipswich, Southampton and Plymouth, and the sales depots at Brighton, Canterbury, Croydon, Luton and Reading. It will be recalled that he transferred from the Midland area in July last year to join the personal staff of Mr. T. W. Heather, sales director. Mr. Bird joined the company's Witton Engineering Works in 1925 as a student apprentice.

Mr. W. J. Bird

Early next month **Mr. G. S. Bone** joins the British Vacuum Cleaner and Engineering Co., Ltd., on the sales management side, to take charge of an important section of the company's activities. He will be mainly concerned with policy and sales promotion matters, and as liaison officer between the management and the Electricity Boards. In this he is well fitted for he had early experience with the electricity undertakings of the Barrow-in-Furness, Scunthorpe, Ealing, and Brentford and Chiswick Corporations, principally on sales matters.

Mr. G. S. Bone

We learn that **Mr. T. G. N. Haldane,** M.A., M.Inst.C.E., M.I.E.E., M.Cons.E., Fel.A.I.E.E., has accepted an invitation to be the president of the Association of Supervising Electrical Engineers. A partner in the firm of Merz and McLellan since 1941, Mr. T. G. N. Haldane joined that concern in 1925, and in those days much of his time was closely connected with matters leading up to the passage of the 1926 Act, which he supported, though at that period such support was not entirely popular. Much of his subsequent work was in connection with the practical working out of the Act and the construction of the Grid. More recently he has had similar interest in the carrying out of the water power development of the North of Scotland under the 1943 Act, but has also been closely concerned with steam power station construction and transmission schemes, and in the development of the gas turbine. He was president of the I.E.E. in 1948/49, and is also chairman of the E.R.A. Committee studying large-scale wind power. Mr. Haldane entered Trinity College, Cambridge, after service in the 1914-18 war, and, taking his honours degree in 1922, spent a year at the Cavendish Laboratory before serving an apprenticeship with C. A. Parsons and Co., Ltd.



Mr. T. G. N. Haldane

Nettle Accessories Ltd. have recently appointed **Mr. D. A. Hopkins** as their representative for the North West Area, including North Wales, Lancashire and Yorkshire.

Capt. W. J. Kent, chairman and managing director of Taylor Tunnicliff (Electrical Industries) Ltd., has been elected president of the British Pottery Manufacturers' Association.

To mark the completion of fifty years' service with W. T. Henley's Telegraph Works Co. Ltd., **Mr. A. W. McArthur,** M.I.E.E., director and works manager of the company's factories at North Woolwich and at Birtley, Co. Durham, was the recipient of a presentation last week. From Sir Montague Hughman, chairman of the Henley organisation, he received a framed engrossment of a Resolution of the Board thanking him for long and loyal service. In addition he received a gift of Savings Certificates, while Mr. J. H. Savage, M.I.E.E., assistant works manager, handed to him a handsome clock on behalf of his colleagues and the factory employees.

Mr. A. W. McArthur, left, receives the timepiece

President of the A.S.E.E. for the 1950-51 session, **Mr. F. W. Smith,** supervising engineer with Rashleigh Phipps and Co., Ltd. (as we briefly reported last week) is one of the earliest members of the Association, having joined in 1914, the first year of its existence. He has had considerable experience in the manufacturing and electrical contracting industries, having been engineer to Electromotors, Ltd., and later, assistant to the general sales manager of Laurence, Scott and Electromotors, Ltd., with whom he served for 25 years. Subsequently he was, for a time, engineer, and later a director of Burdette and Co., Ltd.

Mr. F. W. Smith

After 56 years continuous service with the company, **Mr. F. G. Quance,** A.M.I.E.E., manager of the Accessories Department of the General Electric Co., Ltd., retires at the end of June. Joining the firm in 1894, he took up a senior position in the company's Cardiff area in 1903, and after operating in Bristol and the West of England for about two years before the opening of the Bristol branch, returned to Cardiff as assistant manager of the area. After a period as manager of the Sheffield branch, he became assistant manager to the Lancs and Yorks sales areas in 1915, a position he held until his appointment in 1926 as manager of the company's Accessories Department, at head office. He was a founder member of the B.E.A.M.A. Accessories Section and has served on various technical committees.

Mr. F. G. Quance

OBITUARY

We learn, with regret, of the death on June 8 of **Mr. E. V. Cheney,** aged 59, London district engineer in the British Thomson Houston Co.'s construction department. He joined B.T.H. test department in 1911, transferring in 1914 to the construction department, London district. After war service, he rejoined the firm and went to Birmingham in 1920 as district engineer, and in 1929, after being attached to the Rugby head office construction staff for three years, followed by three years in a similar position at Willesden, he was appointed London district engineer.

The death occurred recently of **Mr. R. Hirst,** aged 53, technical director of Johnson and Co, (Bradford) Ltd., who was well known in contracting circles in the West Riding of Yorkshire.

Mr. W. A. Mombrun, manager of the General Electric Co.'s Dublin branch, died on June 12, aged 64. A Londoner, he joined the firm in 1899, and had since spent over 45 years in Dublin.

Mr. R. Daw, A.M.I.E.E., section head (operations and maintenance), Engineering Department, South Eastern sub-area, London Electricity Board, died on June 14, aged 58. Prior to vesting day he was borough electrical engineer and manager at Dartford, Kent.

We note the death, on June 14, of **Mr. A. Yate,** who was the Glasgow representative of Britannia Batteries Ltd. for many years.

Managing director of Baxendale and Co., Ltd., **Mr. A. L. Darrah** died on June 19.

We note the death on June 16 of **Mr. A. Clark,** aged 76, one of the pioneers of the gramophone industry, who, in his youth, worked on the staff of Thomas A. Edison, in America. Coming to this country in the 'late nineties, he joined a recording concern, and by 1909 was managing director of the Gramophone Co. When that company was merged in Electric and Musical Industries, Ltd., he was the first chairman and its first president. He was chairman of the Radio Industries Council in 1945.

The death occurred on June 15 of **Mr. W. G. Richards,** aged 67, publicity manager of Marconi's Wireless Telegraph Co. Ltd., for 27 years.

American Power Station Practice

Comprehensive Analysis of Post-war Trends in Design

SOME interesting data dealing with the post-war design of American power stations are given in the *Electrical World* of May 8, where a tabulated analysis of some 82 power plants recently built in the United States has been prepared. Approximately two hundred questions, dealing with all aspects of plant operation and construction were asked, and from the answers a fairly comprehensive survey of modern practice is obtainable. The first point to strike the reader is the universal trend toward medium and high boiler pressures. The lowest pressure recorded is 825 lb/sq in.; the highest being 2,080 lb/sq in. Most of the stations are, however, operating in the range 900 to 1,500 lb/sq in. Reheat has been adopted for nine plants, and in seven reheat will be adopted for subsequent units. Feedwater heating extraction points vary in number from three to eight, depending on the boiler-pressures and temperatures, although in thirty cases the feedwater heaters are provided with bypasses. In four of these only, however, is provision made for the high-pressure units.

Steam Generation

One boiler per turbine is definitely the dominant practice being used in sixty cases. However, in several cases the existence of previous plant has resulted in the adoption of three or four boilers for one pair of turbines with provision for coupling them together. Three plants have completely outdoor boiler installations and nineteen semi-outdoor. The three completely outdoor units are located in the south-west, where climatic conditions are favourable. Radiant-furnace boilers are used in 36 plants, only two (Sewaren of the Public Service Electric and Gas Co. and White River of Indianapolis Power and Light Co.) are using slag tap furnaces.

Television has been applied in six plants for gauge glass observation and in one for flame observation.

Alternators

Hydrogen cooling with the surface coolers in the stator shell is practically universal for the alternators. Seventy-three plants are running at 0.5/15 lb/sq in and eight have provision for running at 25 lb/sq in. One alone is designed for 30 lb/sq in. Correspondingly universal is the dependence on temperature dectors in the stator coils although several stations do not use rotor temperature recorders. The generating voltage is generally standardised at 13·8 kV although three plants generate at 22 kV and one at 16·5 kV. Alternators are connected directly to the transformers in forty-eight instances.

Earthing is by resistance in the generator neutral in 40% of the cases; two plants use reactors; thirteen use distribution type transformers with resistance in the secondary; three use transformers with reactors and three use potential transformers.

Rheostatic exciter field regulators are used at twenty-seven units although Amplidynes and Rotatrols are reported specifically at six. Static network regulation is installed at 15 plants. An interesting system is in use at the Warren Station of Pennsylvania Electric Co. where electronic rectifiers are fed from a shaft generator via high speed anode breakers. Voltage regulation is by the controlled firing of ignitrons in conjunction with the electronic supply to the exciter fields.

Control

Centralisation of control is a feature of forty-four of the stations tabulated. Two others mention only the boiler house. One (East River-Consolidated Edison Co. of New York Inc.) has control of the turbine, boilers and high voltage switchgear all located in the same room.

The switchboards are vertical duplex in 32 plants. Visual annunciator panels are used in 73 and flush mounted instruments used in 73.

An interesting table is included in the review giving the manpower/turbine/shift. This varies extensively, ranging from 0·5 to 11, and is in consequence reproduced below.

Men	Plants	Total MW
Up to 1	6	302
1 to 2	9	656
2 to 3	14	649
3 to 4	14	880
4 to 5	8	622
5 to 6	4	320
7 to 11	2	71
		3,500 MW

It can thus be seen that the great bulk of the 3,500 MW is operated with 1 to 5 men per shift per turbine with an average of 3·5 men.

The Resistance of Water Mains

Further Complications introduced into Earthing Problems

by T. C. GILBERT, M.I.E.E.

FOLLOWING difficulties encountered in Rochdale and Manchester, where consumers' installations had been earthed to water mains, investigation showed that parts of the iron water main had been replaced with a length of asbestos-cement main. A technical report was issued by the Electrical Research Association*, and a great deal of useful and interesting information is packed into the few pages making up this report.

The writer is, however, perturbed at the conclusions reached and recommendations made by the authors of the report, as it would appear that the dangerous conditions already existing might be somewhat intensified thereby. For instance, Conclusion 5 states:—

"There is no doubt that asbestos is coming into more general use for water mains, and it is our considered conclusion that where a lead-covered cable is available it should be used for earthing in strong preference to water mains, provided that the sheath is always kept bonded and earthed."

That should be satisfactory enough, although it is pointed out that in one instance, Percy Street, Rochdale, the resistance of the cable sheath was 15·8 ohms; however, in general, cable sheath earthing is adequate, and there is no general condemnation of the method. Certainly it is preferable to earthing to the lengths of service pipes, the resistances of which ranged between 0·3 ohm to 30 ohms.

In a previous recommendation, however, Conclusion 3, it is stated:—

"It is not generally recommended to connect the consumer's apparatus to the lead service pipe alone where the main is asbestos, even though the earth resistance of the service pipe is low, as this may be entirely fortuitous. This connection may be used in conjunction with that advocated in Conclusion 5, to create a reasonably low potential gradient in the immediate vicinity of the fault, especially when the return to the sub-station earth is long and of a relatively high resistance." This means that the water pipe service may be used as a sort of second string to the cable sheath.

Now in these small houses there are almost certain to be gas geysers, or other gas water-heating equipment, and in which both services, gas and water, are connected. Such water heaters are usually located in rather vulnerable positions, over baths or sinks, and it would not appear to be a very wise step to extend any possible potential gradient on to this equipment. However, there is a more serious objection than this, which is that, according to the records of resistances, in some cases the gas pipes present a better earth than do either the cable sheaths or the water pipes.

District Variations

For instance, at No. 6 Ash Grove, Manchester, the water-pipe service resistance is 1·7 ohms, the cable sheath 0·7 ohm, and the gas pipe 0·27 ohm. At Longwood Road, the resistances are: water pipe, 2·95 ohms, cable sheath, 0·5 ohm, and gas pipe, 0·6 ohm. Two cases from Rochdale, Manchester Road has water pipe, 6·3 ohms, cable sheath, 0·90 ohm, and gas pipe, 0·78 ohm; whilst in Lowther Road all three resistances are equal, 0·9 ohm. In the majority of these cases, therefore, earth fault current will be carried by the gas pipe in the largest proportion, all because of the supplementary connection of the useless water pipe into the earth electrode provided by the cable sheath.

The aim of preventing a serious voltage gradient in the vicinity of the fault is laudable, but if investigators were less preoccupied with shock risks and occasionally took a look at fire risks associated with persistent earth leakage due to high earthing resistances, some recommendations would be different. In the writer's opinion, the connecting in of the water service pipe should be definitely prohibited, at least in such buildings where there is a gas service, and where gas water-heating equipment is used. Otherwise the gas pipe will provide the earthing point for the installation, with all the possibilities for fire that this entails.

No doubt the breakaway from water-pipe earthing will be difficult—we have enjoyed it for so many years—but it appears to be altogether too dangerous to keep it in the earthing system, when alternative earth connections are made, especially under the conditions visualised above. Regulations should provide for one earthing point alone, with no sort of supplementary connections whatever; potential gradients *may* prove dangerous, but fires certainly will.

* Electrical Resistance of Water Mains, with Particular Reference to the Asbestos-Cement Type. Ref. V/T101. By Messrs. Darby & Fawssett.

The BUYER'S *Column*

New Accessories for the Mary Ann Mixer

THREE new accessories for the "Mary Ann" mixer made by THORN ELECTRICAL INDUSTRIES LTD., 105 Judd Street, London W.C.1, have now been released and are being shown at the B.E.P. Convention exhibition.

These comprise a fruit juice extractor, made of moulded plastic and retailing at 22s. 6d. tax paid, a combined mop holder and brush which with two mops, one fabric and one of sheepskin, forms a useful polishing outfit; and a small carborundum grindstone intended for sharpening knives, scissors and other small domestic tools, at 12s. 6d.

Recommended for use with this latter item is the new plastic dust cover (7s. 6d. tax paid) to protect the machine from damage through the ingress of fine particles from the grindstone.

Evershed Precise Tank Gauge

THIS new unit recently placed on the market by EVERSHED AND VIGNOLES LTD., Chiswick, W.4, is a null point displacer system gauge for local and remote indication of liquid level in tanks. Its accuracy makes it eminently suited for use at oil refineries, chemical works and other industrial plant where exact indication of quantities is an important factor.

The new gauge marks a distinct advance on float controlled systems. The transmitter is, in effect, an automatic dipstick installed on the top of the tank and readings are accurate to within a tenth of an inch irrespective of range. A local indication is given, and the reading is also transmitted to distant receivers which have double concentric dials normally marked in feet and inches.

A feature of the system is that zero adjustments on the transmitter can be made without breaking the flameproof jointing.

G.E.C. release new Cooker Control Unit

A NEW range of cooker control units for a.c. circuits up to 30 amp at 250 V is announced by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

The units comprise a double pole, short break, silent action main switch and a 13 amp shutter-type socket outlet with fused 3-pin plug or alternatively a 15-amp shutter-type socket outlet with a separately fused 3-pin plug. In both cases, control is by a "Mutac" d.p. 15-amp switch.

The case of the unit is a steel pressing enamelled cream with an ivory colour "Bakelite" front plate. One-inch clearance knockouts are provided in the case, two at the top, two at the bottom and one at the back.

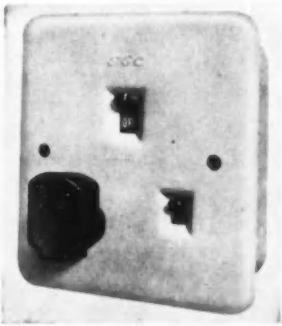
List prices of standard unit flush or surface fixing are as follows: with 13-amp 3-pin plug and socket, 30s.; with 15-amp 3-pin plug and socket, 32s. 8d.

Cooking the Parnall Way

THE new cookery book recently published by PARNALL (YATE) LTD. has been issued in two editions, one for the EC5-6 cookers and one for the EC10-12 export models, which, having no separate grill, require different techniques.

Designed by W. H. Gollings and Associates Ltd. and printed by Adams Bros. and Shardlow, the book shows evidence of real imagination in its production; the covers being in white plastic, easily cleaned with a damp cloth and the spirax-type binding allows it to lie flat when opened, and the simple and practical recipes are thumb-indexed. There is a pocket at the back for loose cuttings. When purchased separately the price is 7s. 6d.

Left: The "Mary Ann" mixer adapted by means of the new accessories as a polishing unit

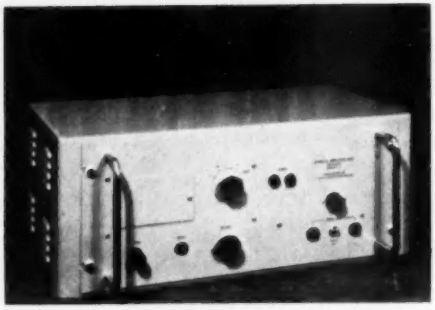


Right: G.E.C.'s new cooker control unit

Teacher's Dream

BETTER listening in schools sounds something like a school teacher's prayer, but by courtesy of E. K. COLE, LTD., Southend-on-Sea, it becomes a fact.

The most recent addition to the Ekco schools radio range is the 4 watt radio aid amplifier unit



This is the Ekco SR23 schools radio unit

type SR23 designed for use in the smaller schools where three or four speakers will prove sufficient.

The unit system of design is again adopted in view of the ease of maintenance provided by this style. Both radio feeder unit and amplifier unit are housed in a single rack with front panel 19 in. by 8 in.

Provision is made for a 3 ohm outlet for the monitor speaker and a 1,500 ohm outlet for the remaining speaker system. A socket is incorporated for the use of a playing desk.

Four pre-set stations are offered and the range of frequencies covered is from 150 to 1,550 kc/s. Power consumption is 45 W.

"Dupar" Drum Switch rating increased, price reduced

TO balance increases in other directions comes news of a reduction in price. The Dupar type "A" drum switch made by DEWHURST AND PARTNER LTD., Inverness Works, Hounslow, Middlesex, has proved popular with engineers and the firm are therefore able to reduce the unit selling price by a further 22%.

At the same time, as a result of ten years satisfactory service due to various improvements introduced from time to time the nominal rating of the switch is increased by 50% to 3 h.p., 400 volts, 3-phase, 50 cycles, or the equivalent. These modifications came into effect last Monday.

TRADE PUBLICATIONS

ALUMINIUM. The growth of an industry and the current applications of its principal product are the subject of an illustrated essay by the British Aluminium Co., Ltd., Salisbury House, London Wall, E.C.2. Its title is "British Aluminium Applied," and it is available in brochure form.

KETTLE ELEMENTS AND DOMESTIC APPLIANCES. These are described in List AL/127, issued by Metway Electrical Industries, Ltd., King Street, Brighton.

STAGE LIGHTING. Details of a comparatively new application of fluorescent lighting are to be found in brochure AL/76 which has been produced by Thorn Electrical Industries Ltd., 105 Judd Street, London W.C.1.

NUMBER WHEELS AND PINIONS. Specialists in the manufacture of number wheels and pinions in tin alloy and plastic (styrene and acrylic resins) are the H. J. Thormann Engineering Co., Ltd., Elstree Way, Boreham Wood, Herts. A survey of the company's range of products can be found in their latest brochure.

CONDUIT FITTINGS. Simplex Electric, Ltd., Broadwell, Oldbury, Birmingham, have published a booklet explaining the Z.I.R. (zinc impregnated rustproof) process. The style adopted to "put over" this idea is somewhat novel.

SWITCHGEAR AND ACCESSORIES. Sales literature in keeping with the attractive yet utilitarian design of their products has been published by Bill Switchgear Ltd., Aston Lane, Perry Barr, Birmingham. Publications are as follows: (1) General list giving current consolidated prices (450GL); (2) Electrical Accessories List No. SWP150 covering Metalclad plugs; (3) Accessories List A249; (4) Insulated Switchgear List INS450; and (5) "Bill" Streamlined Cooker Control Units List No. CS550.

MOTORS. "Brook Motors in Cable Making" is the title of an interesting brochure just issued by the company, Brook Motors, Ltd., Empress Works, Huddersfield.

FANS. The words "Sturtevant" and "fan" have been complementary in the minds of most engineers for many years now. So that it is appropriate that a Leaflet (No. 3002) giving up-to-date propeller fan data has been issued by the Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London E.C.4.

REMOTE CONTROL APPARATUS. Remote control as applied to District holder stations, and the supply of town gas in bulk is the subject of an interesting brochure published jointly by Automatic Telephone and Electric Co., Ltd., Strowger Works, Liverpool 7, and Bryan Donkin Co., Ltd., of Chesterfield.

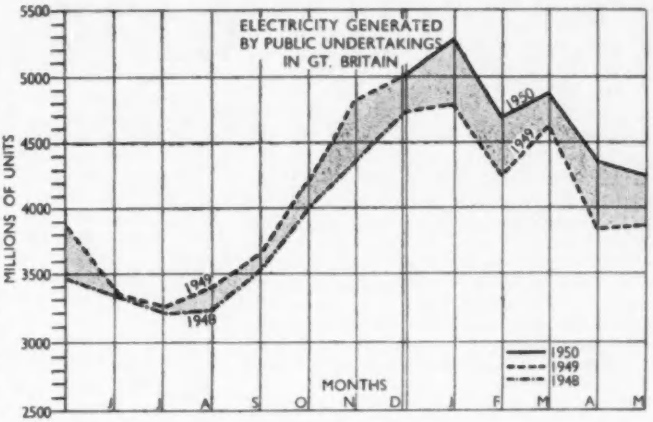
SIGNALLING AND TELEPHONE EQUIPMENT. A well-produced loose-leaf type book, the new catalogue of "Wigan" signalling equipment should prove most interesting to mining engineers. "Wigan" equipment is made by Heyes and Co., Ltd., Water-Heyes Electrical Works, Wigan, Lancs.

UNITS GENERATED

During the month of May, 1950, a total of 4,255 million units was generated in stations under the control of the B.E.A., the North of Scotland H.E. Board and the Lochaber Power Co. The corresponding figure last year was 3,850, so there has been an increase of 10·5%.

Of the total, 4,142 million units was generated in steam stations and 96 million in hydro-electric.

Energy sent out during the month was 4,012 million units, 94·3% of that generated. This gives the total for 1950 so far as 22,132 million units, an increase of 10·1% on the corresponding period in 1949.



POWER SUPPLY IN MAY

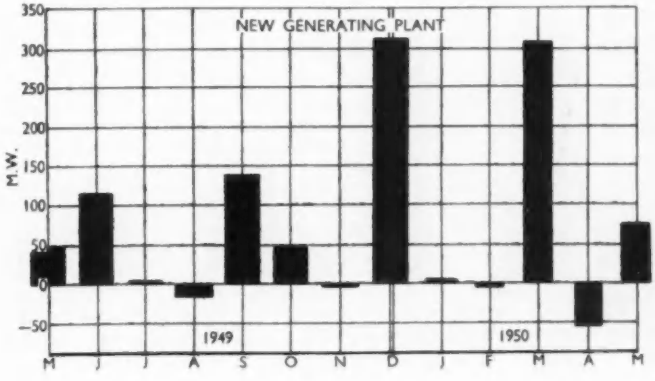
TWO sets have accounted for the 75 MW increase in the generating capacity of the B.E.A. recorded for the month of May. The first of these is the second of the three 30 MW English Electric sets being installed at West Ham "B" (London Division), while the other makes the fourth 45 MW Metropolitan-Vickers turbo-generator to come into operation at the Eastern Division's Cliff Quay station.

Output, as distinct from installed, capacity has been further increased by the commissioning of a second 240 klb/hr boiler at Staythorpe (East Midlands Division). The Babcock and Wilcox high-head type boilers at this station, which generate steam at 950 lb/sq in., 925° F, were described in our issue of May 18.

Units generated show only a slight drop compared with last month in both the B.E.A. and North of Scotland returns. The increase compared with last year was 10·6%, and it is interesting to note that on a three-monthly basis the increase in twelve months has been between 9% and 10% for the whole of this year so far.

This increase has been accomplished with an installed capacity of generating plant which has varied between 5% and 7% above that available twelve months past.

Interest also attaches to the trend of hydro-electric generation this year. B.E.A. figures have fallen steadily from 76 million units in December to 26 million in May. Scottish figures, on the other hand, have shown far less variation, the peak being 82 million units in January, the lowest figure since being the 60 million units recorded for February.



GENERATING PLANT

At the end of May, 1950, the installed generating capacity of the B.E.A. was 13,864 MW, 75 MW more than at the end of April. The North of Scotland H.E. Board total has increased by 1 MW, and this brings the overall increase in the past twelve months to 913 MW, or 6·9%.

The installed capacity, used for the purpose of this diagram, should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam and electric sides and are suitable for use.

THE WEEK

INDUSTRY *in news* COMMERCE

Let Electricity aid Productivity

IMPACT of electricity on the economics of production is to be stressed at an I.E.E. conference in the autumn.

On November 15 and 16, the Utilisation Section are holding a conference on "Electricity as an Aid to Productivity" in order to make available to industry the most up-to-date information concerning the contribution that factory electrification can make to the country's efforts towards increased production.

The conference is mainly intended for those executives in both large and small factories who are responsible for production. It will consist of a series of lectures each followed by a general discussion. The lectures will show, in general terms, what electricity can do to increase production rather than give full technical details of the apparatus with which these improvements can be achieved.

It is thus hoped to stimulate thought among industrialists, so that they will obtain further information from established sources. Subject matter of the lectures will come under the following broad headings: (*a*) Motive power in the factory; (*b*) industrial heating processes; (*c*) welding applications; (*d*) the handling and inspection of materials; and (*e*) lighting, heating, ventilation.

Light Fittings: Revised Discount

A LETTER to all N.E.C.T.A. members from the Association's London headquarters summarises the new discounts on electric light fittings as outlined in the latest edition of the Fair Trading Policy. The Association points out that the revised trade discount and reduced terms to *recognised users* on decorative and commercial fittings came into force on April 1, 1950; and that the reduced discount to *special large buyers* on decorative, commercial and industrial fittings comes into operation on July 1.

Census of Production, 1950

FOR 1950 only, the Board of Trade has decided that the building and contracting trades will not be included in the Census of Production. As a result, E.C.A. members who concentrate solely on electrical contracting and other contracting activities associated with the building industry will not have to make a census of production return for 1950. Where, however, a member made a return on the electrical engineering trade schedule and included under the appropriate heading particulars relating to their contract work, they should continue to do so for 1950. In addition, any members who have hitherto made separate returns in respect of separate establishments engaged in manufacturing and contracting work respectively, should make returns for 1950 in respect of their manufacturing establishments only. This information relates solely to the 1950 Census of Production. Members with retailing interests will be called upon to complete Census of Distribution returns as previously advised.

Census of Distribution, 1951

TRADERS in the wholesale and retail distributive trades are being asked by the Board of Trade to keep a note of the number of people they employ and salaries paid during this week (ending June 24). The information is required for the first Census of Distribution which the Board will carry out next year.

Besides data about their sales and purchases etc., traders will then be required to give the number of persons, male or female, full or part time, aged 18 and over, or under 18, working in each establishment, and any wages or salaries paid.

Extension by C. A. Parsons

C. A. PARSONS AND CO. LTD., Newcastle-on-Tyne, who have been carrying out a large modernisation scheme for some years, are to build a new design and research building seven storeys high. Subject to licences and other permits being granted, it is hoped that building work will begin early next year. Sir Claude D. Gibb, managing director, stated that to proceed with this plan with the present high levels of company taxation would mean a considerable strain upon their finances, but the work had to be done in the interests of maximum efficiency, and could not be postponed any longer.

The First Half-Century

The Municipal Electric Association

FIFTH ANNUAL CONVENTION

Huddersfield

Wednesday, June 20

Presidential address by A. B. Mountain, Borough Electrical Engineer, Huddersfield. Papers for discussion:—

"Means for Stimulating the Demand for Electrical Energy," two papers by Alderman W. Potter, Taunton, and H. C. Bishop, Wigan.

"Electricity Works for Small Towns." Two papers by C. F. Vesey-Brown, Lincoln, and G. M. Harriss, Bray.—*From our issue of June 21, 1900.*

Site-recruited Labour

A NEW agreement concerning site-recruited labour in the electrical contracting industry has been reached between the National Federated Electrical Association and the E.T.U. Operating from this month, it stipulates that operatives taken into service on the site of a contract within the boundaries of an area or place administered by a city, county borough, borough or U.D.C., shall receive travelling time and fares for the return distance between the site of the contract and the recognised Council centre. For operatives taken into service otherwise, the payment shall be : for journeymen electricians, 2s. 6d. per day; adult males, 2s. per day; and for labour under 21 years of age, 1s. 6d. per day.

When London's Lord Mayor, Alderman Sir Frederick Rowland, laid the foundation of a block of flats at Vanbrugh Park recently, he was shown this Electrolux refrigerator in one of the flats already built

Industrial Art Bursaries

COUNCIL of the Royal Society of Arts is again organising an industrial art bursaries competition which this year has been extended to cover domestic electrical appliances as well as electric light fittings. A bursary of £150 in value is offered to the winning candidate in each section.

Primary purpose of these bursaries is to allow successful candidates to broaden their knowledge and experience by travel abroad and the study of foreign design. The competition is open to full-time, part-time and evening-class students between the ages of 17 and 30 on September 1, 1950, who intend to take up industrial design as a career, and have studied for not less than one term since September 1, 1949, at an art, architectural, technical or other college or school approved by the Society for the purpose of the competition. Particulars and entry forms can be obtained from the Secretary of the Royal Society of Arts. Closing date for the receipt of entry forms is September 30.

National Register

AT THE end of 1949 there were1,041 names on the National Register of Electrical Installation Contractors, it was revealed at the 4th annual general meeting recently. During the year 59 new certificates and four reinstatements were made, but 84 names were deleted for various reasons. Inspections were made of the work of 96 applicants, and routine inspections of the work of 381 certificate holders were carried out. Because the B.E.A. did not think there was any possibility of compulsory registration at present, the aims and objects of the National Register should be maintained. After discussions with E.C.A. and the E.C.A. of Scotland, it was proposed to reconstitute the N.R.E.I.C. under the title of "National Inspection Council for Electrical Installation Contracting."

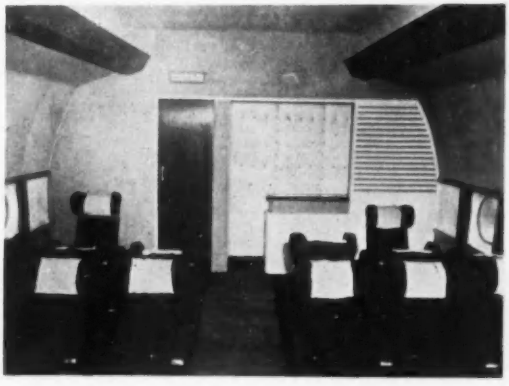
Vacancy for a Fellow

EARLY in August the research committee of the Institution of Heating and Ventilating Engineers is to consider applications for a new Fellowship worth £350 for one year. The Fellow selected will normally work at the National College for Heating, Ventilating, Refrigeration and Fan Engineering, in Borough Road, S.E.1.

The Fellowship follows an announcement in February by the retiring president, that the Council had decided to devote a portion of the research fund to the collation of existing data and the preparation of a report or reports in a form suitable for use in industry.

Intercom. Sets Help Learners

TO ASSIST in training large numbers of extra drivers now being recruited, London Transport is making use of intercommunication sets in instruction vehicles. The sets enable an instructor, seated inside a vehicle, to give instructions to the driver



For the Brabazon 1, which last week visited London Airport, G.E.C. has supplied fluorescent lighting equipment. Our photograph shows a section of the passenger cabin with cocktail bar. Twenty-five Osram 2 ft. 20-watt warm white lamps provide indirect lighting, the power being specially converted from 28 V d.c. to 110 V 400 cycles a.c.

At Yorkshire Board's luncheon: Back row (l. to r.), Miss J. Pope, Miss J. Youngson, Mr. J. Fawcett, Miss I. J. Lambert, Miss B. D. Searle; front row, Miss N. Seddons, Miss B. M. Ramsden, Miss L. M. Kaye, Miss M. Bradshaw, Mrs. E. J. Parnell

at the wheel, and at the same time to listen to the driver "thinking aloud" as he drives.

Four sets are in use and four vehicles are at present equipped to accommodate them. Each set is made by Trix Electrical Co. Ltd., and comprises a loudspeaker and a throat microphone for the driver, and an amplifier with built-in loudspeaker and a hand microphone for the instructor. Conversation is controlled by the instructor by means of a push-button. Power is supplied from the vehicle's 12-volt lighting battery via a rotary converter.

Prizes for good Public Speaking

SPEAKERS who took part in the Yorkshire area finals of the E.D.A. public speaking competition were entertained to a luncheon recently, when prizes were presented by the deputy chairman of the Board, Mr. F. Newey, who is also a member of the E.D.A. Council.

To Miss L. M. Kaye, he presented the national trophy and replica, as well as a certificate and £5 cheque, for winning the Yorkshire area competition. Mr. Newey also presented a certificate and cheque for £3 to Miss B. M. Ramsden, who won second prize in the area. Miss M. Bradshaw was third prize winner.

Scemco ask the Engineers

ABOUT to commence production of street lighting lanterns with fluorescent tubes, Scemco Ltd. are currently circularising 500 civic lighting engineers in Great Britain. After pointing out some of the advantages of fluorescent street lighting—low consumption, improved colour, low glare, and long life—the questionnaire asks for their opinion on the siting of columns.

Engineers are also asked what kind of installation they prefer, especially as regards the type of column, position of control gear, method of suspension and power of lanterns.

T.V. Aerial Siting

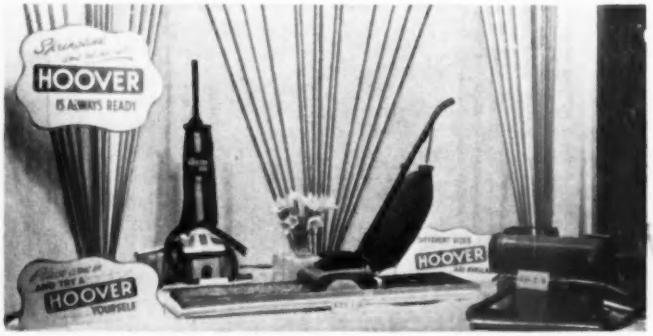
EXPERT guidance on the placing of television aerials is given in a booklet circulated by the radio industry to local authority surveyors throughout Great Britain. Entitled "Television Aerials—Outdoor or Indoor," the booklet is published jointly by the Radio and Electronic Component Manufacturers' Federation and the British Radio Equipment Manufacturers' Association.

The publication is timely. Local councils in many T.V. reception areas are finding themselves more and more concerned with the siting of T.V. aerials. Helpfully, the booklet outlines factors to be considered in siting aerials, and lists a number of firms who carry out installations.

The booklet (obtainable from the Secretary, R.E.C.M.F., 22 Surrey Street, London W.C.2, post free 1s.) ends with a plea to motor vehicle owners to eliminate interference at the source by fitting a suppressor costing not more than 2s.

Portland Playbill

THE PORTLAND Players, the amateur dramatic section of the B.E.A. Sports and Social Club, have travelled far since their maiden effort last December. In *Ladies in Retirement*, produced on



Eastern Board's Leiston service centre was awarded first prize in the Hoover spring window display competition, Group "A," S. Eastern section. Their display, pictured here, comprised two moving endless carpets, one covered with kapok disappearing under the Hoover, the other emerging perfectly clean

Friday, they managed very well to capture the atmosphere of almost unbearable tension which is a feature of certain scenes of the play.

Renee Futcher gave a masterly interpretation of the part of Ellen Creed, while Gloria Henshaw and Margaret Stratton were more than equal to the parts of Louisa and Emily, the unbalanced sisters. Lawrence Clark's Albert Feather, a Victorian spiv, was very lifelike, as was the part of Leonora Fiske, a not-quite lady who had enjoyed her past, played by Nip Nunn. Jean Ward and Joan Forster both gave pleasing renderings of Lucy and Sister Theresa. The producer was Mrs. E. M. Manning.

Mr. A. O. Johnson, chief commercial officer, N.W. Board, presents awards to the winning team. On Mr. Johnson's right is Mr. E. G. Wardle, manager, No. 2 Sub-area, and behind him is Mr. N. H. Bridge, commercial development officer

Trams are Cheaper

LONDON'S trams should not be displaced by buses, because they are the more economical of the two to operate, was one of the points made last week at the Transport Tribunal which is hearing the case for a fares equalisation scheme in the London area.

Mr. W. A. H. Parker, a consulting electrical engineer, giving evidence for the London Passengers' Association, said that he believed the cost of displacing each South London tram by a bus to be £6,000 to £7,000. A new type of tram carried 84 passengers, an interesting fact, since carrying capacity in rush hours was important.

Mr. Parker gave comparative figures of running costs, and said that at an average of 10 miles an hour a new-type tram which carried 84 passengers would cost 2·2d. a car mile. The new buses carrying 56 passengers and operating on diesel oil, cost 2·95d. a car mile to operate.

Electricity cuts out Drudgery

"HOUSEWIVES are no longer content to spend long working hours in the home, and with modern electrical appliances it is not necessary," the Mayoress of Bridlington, Miss D. Clarkson, told the inaugural meeting of Bridlington branch of the Electrical Association for Women, last week. Mrs. E. Lomas, area organiser, said that women were to blame for working all these years without the necessary apparatus, but the Association believed that the cost of many home electrical appliances should be lowered.

Officers elected were: President, the Mayoress of Bridlington, Miss D. Clarkson; vice-presidents, Mrs. H. R. Milner and Mrs. M. F. Longbottom; chairman, Mrs. A. Moore; vice-chairman, Coun. Miss H. M. Padgett; secretary, Mrs. R. K. Gibson; minute secretary, Mrs. W. M. Brown; treasurer, Mrs. M. Waterhouse.

Prizes for Salesmanship

FOUR salesmen and four lady demonstrators employed by N.W. Board, recently received presentation pencils to mark the Board's acknowledgement of a novel and successful selling scheme organised by the commercial department at the Manchester "Brighter Homes" exhibition.

One day was allotted by ballot to each of four of the Board's sub-areas concerned in the exhibition, to see which sub-area team produced the best selling results from the Board's exhibition stand. Points were awarded according to the type of apparatus sold and enquiries received, and the winning team, in a close competition, proved to be that of the No. 2 Sub-Area. Presentations were made by the Board's chief commercial officer, Mr. A. O. Johnson, and the members of the winning team were Messrs. Gorton, Dean, Griffiths and Carey, and Misses Coop, Swift, Kenyon and Porter.

Window display designed by S.W. Board's Paignton service centre for the Hoover competition won first prize in Group "A," Western Section

New Basis of Measuring Trade

THE BASE year of index numbers of the volume of U.K. imports and exports is being changed from 1938 to 1947, the Board of Trade announced last week. The Board say that because of the con-

Comprehensive display of Henley products which was recently staged by a subsidiary company, Oakley Bros. Foundry

tinuous increase in the volume of our export trade since the end of the war, it was felt that a more recent base year would be more reliable for comparison.

The index numbers—which have been prepared for the Board of Trade since the beginning of the century—are designed to show trends in imports and exports after variations due to price changes have been eliminated. Prior to the war they were changed every five years or so.

Minimum Standard Recommended for Demonstrators

BEARING in mind the importance of the part played by the demonstrator as a link between Boards and the public, the Association of Electrical Housecraft Advisors have recently made recommendations concerning minimum standards of training and experience for women appointed as demonstrators.

It has been unanimously recommended that ". . . any woman accepted into the Demonstration Section of any Board should hold, as a minimum qualification, the E.A.W. Housecraft Certificate," and that "Trainees should remain as showroom assistants until in receipt of their full domestic science qualifications and E.A.W. Housecraft Certificate."

Electrical Housecraft for Teachers

PROGRAMME for the Summer School of Electrical Housecraft, open to science and domestic science teachers from all parts of the country, which the E.A.W. is arranging at King's College of Household and Social Science from September 21-26, has just been published.

Lectures and practical sessions include the theory and wiring of simple electric circuits, and the wiring and working efficiencies of appliances. On the domestic side there are lectures and demonstrations on the design and use of electrical laundry equipment, electric cookers, and refrigerators, and small appliances.

The sessions will be conducted by members of the College staff—in particular Miss T. J. Dillon, M.SC., head of the physics department of the College, and Miss J. E. Walley, B.SC., head of the household arts department; and by Miss M. E. Bailey, B.SC., head of the E.A.W. housecraft department. The teaching of electrical housecraft in schools will be demonstrated by Miss M. J. Gordon, B.SC., M.A. Mr. Philip Honey, of E.D.A., is to speak on the "Structure of Electricity Tariffs."

B.E.P.C. Exhibition

THREE errors may have led to an erroneous impression in our review of the B.E.P.C. exhibition last week. On page 996 the Tucker radio interference suppressor plugs mentioned are round pin types for use in B.S. 546 outlets. They have no connection with ring main circuits which should apply to the surface 13A pattern socket. Secondly, on page 994, Revo's "Aerofan" was misspelt as "Aeropan." Heatrae's stand number is 37.

Nottingham's New Trolleybuses

SEVENTEEN of the new large-seating capacity trolleybuses, brought into service by Nottingham Corporation Transport, are fitted with electrical equipment supplied by Crompton Parkinson. The buses have B.U.T. 3-axle Type 964T chassis and bodies built by Brush Coachwork Ltd.

The d.c. traction motor, Type C.422, has four

One of Nottingham's new trolleybuses

main compound-wound poles and commutating poles, for operation on 550 volts, at a one-hour rating of 120 h.p. Class "B" insulation is used throughout, with the armature coils, series and shunt field coils, fully bakelised and pressed, and the motor is "floodproof."

An outstanding feature of the "PA" control gear, manufactured by Allen West and Co. Ltd., is that all electrical control items are mounted on one insulating base panel. Low voltage equipment includes a C.A.V. Type D.13/TB/1, designed to supply 32 volts and a maximum output of 50 amps, at a minimum speed of 690 r.p.m.

NEWS IN BRIEF

In our report of the formal opening of Cliff Quay power station, given in our issue of June 15, we stated that the plaque was unveiled by Lord Citrine. In fact this ceremony was performed by Ald. Grimwade. We also stated that Ald. Grimwade mentioned Capt. J. M. Donaldson as being associated with the scheme; this reference should have been to Mr. Vowles.

Report of a visit made by traction and electrical engineers to certain German collieries last year, *Underground Trolley Locomotive Installations in the Ruhr*, has just been published by the production department of the National Coal Board.

A handsomely bound book, profusely illustrated and well-written, commemorating the first fifty years of Metropolitan-Vickers Electrical Co. Ltd., has just been issued. Edited by Mr. John Dummelow, M.A., M.I.E.E., the book reviews the firm's history from the founding of the Westinghouse Electric Co. Ltd., in 1899, to the latest achievements of research and development.

E. K. Cole Ltd., are offering a two-day trip to Southend, with all expenses paid, to the Ekco dealer's salesman in Scotland who can produce the best paper on "How I would maintain radio sales after the coming of television."

Recently increased railway freight charges are now published in a standard charges scale by the Railway and Shipping Publishing Co. Ltd., 12 Cherry Street, Birmingham.

First of a series of technical publications, "Examples of Structural Steel Design to Conform with the Requirements of B.S. 449: 1948," has just been issued by the British Constructional Steelwork Association. The brochure is intended to assist designers to take fullest advantage of the new B.S. specification.

The Radio Industry Council has informed the Postmaster General suggesting the erection of temporary apparatus to establish a cross-Channel television link. Coastal stations on each side of the Channel would enable a London-Paris link-up of T.V. programmes.

Questions in Parliament

Tax on Vehicles

When the Finance Bill was considered last week, during discussion on the proposed purchase tax on goods vehicles, Mr. Jay, financial secretary to the Treasury, said that it had been agreed that, in regard to electrically propelled vehicles, the batteries would be outside the tax The Bill would also be amended so that purchase tax would apply only on the value of the chassis of the vehicle. Those vehicles which were to be exempted from the original proposals would also be exempted from the chassis tax. The first was for pedestrian-controlled vehicles, sometimes described as "prams." He thought that would go some way to meet the arguments, particularly, about the physical strain on those engaged in retail distribution, which had been advanced about electric vehicles. In fairness to the petrol-driven vehicle generally, it would be impossible to exempt all electrical vehicles and retain the tax on petrol vehicles, however.

Subsequently, Sir W. Wakefield, while appreciating the concessions, urged that further consideration be given to the peculiar position of the electric vehicle, suggesting that there was no reason at all why these vehicles should have purchase tax put upon them.

Suppressors for Cars

When asked if he would now introduce legislation making suppressors in motor vehicles compulsory, Mr. Ness Edwards said the A.A., R.A.C. and the R.S.A.C. supported a policy of voluntary action, and it was not proposed to take legislative action until the progress of that method was seen.

Supply in Dominica

Asked if he was aware of the inadequacy of the electricity supply in Dominica, Mr. J. Griffiths said the Colonial Development Corporation had undertaken to install and operate hydro-electric plant to supply light and power. It was hoped that this plant would be in operation early in 1952.

Joint Meter Reading

The question of the discontinuance of joint meter readings for gas and electricity in Rochdale was raised by Mr. J. Hall, who pointed out that the practice in the area was instituted in 1941 but discontinued when the electricity and gas boards of the North West region began to operate. He alleged that the Corporation paid their meter readers £7 8s. a week whereas the Boards paid theirs £5 17s. Replying, Mr. Robens, parliamentary secretary to the Ministry of Fuel and Power, said that both the electricity and gas consultative councils in the North West had considered the question and had decided that the balance of advantage in that area was on the side of separate meter readings. The Ministry considered it a matter on which it should not issue directions, it being left to the boards to decide in the light of local circumstances. He understood that in Rochdale there were only 16,000 out of 41,000 where both gas and electricity was installed. Another side to the matter was that the boards wished to train and equip men to not only read meters, but help consumers by advising them about appliances, to note any repairs necessary, and give an instruction to the appropriate department to do any work.

Electric Supply News

Driffield

Because of the restriction on capital expenditure the Yorkshire Electricity Board has notified Driffield Urban Council that it is not in a position to give an assurance that a supply of electricity can be made available in the near future for 48 houses on the Council's Eastfield-road Estate. It was therefore decided that tenders received for wiring work should be destroyed unopened. The Electricity Board has also told the Council that they cannot make any promises about the introduction of a new street lighting system for the coming winter.

Dunston

A new generating set and boiler is expected to be in commission by September at Dunston power station. Another new set was operated at reduced capacity last winter on steam from the existing boilers, but a further boiler has been installed and the set will this month be at full capacity.

Middlesbrough

The North-Eastern Electricity Board was criticised at a meeting of the Corporation General Purposes Committee, concerning the installation of electric fires in council houses. Cllr. A. G. K. Crass stated that the Board, as consulting engineers, gave advice regarding the installation of the fires, then as electrical engineers had installed them. Afterwards, the Board, as a statutory authority, told the Corporation that the fires were not in the right place, and asked the Corporation to put them right. Cllr. Crass suggested that the Corporation should appoint a firm of consulting engineers. Another member asserted that he was told by the Electricity Board not to install the fires until the Board had indicated the proper place. Afterwards the Board said the fires had been installed incorrectly, and the Corporation was asked to rectify the matter. The Committee decided against appointing consulting engineers.

N. Ireland

During discussion on the Erne Drainage Bill, in the committee stage, Sir Roland Nugent, Minister of Commerce, suggested that if the Government of the Republic failed to honour the agreement with Stormont on the Erne hydro-electric and drainage scheme, the North could close the sluice gates on the Co. Fermanagh side of the border and deprive the E.S.B. generating station on the Lower Erne of water. He was answering an allegation that there was no guarantee that the Eire Government would carry out the agreement. It was pointed out that the scheme would benefit both countries.

N. of Scotland

The Board's experiment of allowing reduced charges during the two winter quarters in the Lochaber and the Skye and Lochalsh areas last winter had proved so successful that the Board had decided to extend the scheme, Mr. G. T. M'Glashan, chairman of the Electricity Consultative Council for North Scotland stated last week. It is to be extended to domestic and business consumers in the whole of the Board's district, whether electricity was generated by water or steam power. In future the number of units charged at ¾d. for a 4-roomed house would be 324 in the winter quarters, further consumption being at ½d. per unit. This move is to encourage the use of electricity in view of the large hydro-electric power stations now coming into operation.

It was also reported that in the first five months of this year, a further 8,786 consumers were connected, of whom nearly 6,000 were in rural areas, villages and small burghs. The Board now serves 231,000 consumers.

South Wales

A scheme which, by making use of water at present running waste in the Elan Valley, would have added to the electricity power supply in South Wales has been rejected by the Ministry of Health. The scheme, the result of negotiations between the South Wales Electricity Board and the water department of Birmingham Corporation, was to replace two small generating sets at Caban-Coch dam, with two larger units. It was estimated that about 1·4 million units a year would be available to the Board. At last week's meeting of the City Council, when the news of the Ministry's rejection of the scheme was given, it was suggested that a new approach to the Ministry be made through the South Wales Electricity Board.

Salisbury

The city engineer has reported that he had accepted an offer from the Southern Electricity Board for the purchase of 200 reconditioned electric cookers at a cost of £11 each, with a twelve months guarantee. Questioned as to whether it was true economy, he said the cookers were indistinguishable from new, and he could see no reason to pay another £11 for a new frame.

LIGHTING SCHEMES

Amesbury.—The Southern Electricity Board is preparing a scheme for sodium or mercury vapour lighting a portion of the main London-Exeter road.

Bexley (Kent).—The Council is to extend its sodium discharge lighting.

Blackpool.—The Ministry of Transport has imposed a £20,000 limit on the amount the Corporation can spend on improving and converting from gas to electricity its street lighting.

Bootle.—The works committee has approved a scheme for the provision of sodium lighting in Marsh Lane at a cost of £1,209.

Company Activities

Aberdare Electric

Net profit to March 31 last was £7,984, plus rent, interest and fees £1,387, and £1,050 brought in, making £10,421, less tax £1,857. To preliminary expenses £1,295, dividend 2½% £3,544, leaving £3,725 carried forward.

W. N. Froy and Sons

Trading profit for 1949, including dividend from subsidiary, etc., was £83,629 (*£106,445*), after allowing directors' emoluments £12,287 (*£17,266*), bad debts and staff bonus. To directors' fees £473 (*£550*), amortisation leasehold property £176 (*£156*), depreciation £4,894 (*£4,407*), audit fee £525 (*£420*), leaving net profit £77,561 (*£100,912*), balance from last year £43,157 (*£40,289*), taxation no longer required £1,986 (*nil*), E.P.T. refund £140 (*nil*), making available £122,844 (*£141,201*). To taxation after deduction of initial allowances: profits tax £11,039 (*£13,634*), income tax £29,110 (*£41,210*). To general reserve £25,000 (*£30,000*), Preference dividend £4,950 (*same*), Ordinary dividend 10% on increased capital £8,250 (*same*), leaving £44,495 carried forward.

Garrard Engineering and Manfg. Co.

For the year ended January 31 last, profit was £64,084 (*£80,530*), after charging U.K. tax £69,136 (*£90,444*). Surplus on provision for subsidiary company debt included in profit £1,455 (*nil*). Final dividend 12½%, making 25% (*both same*).

Harland Engineering Co.

Consolidated trading profit for 1949 was £112,911 (*£128,347*), plus investment income £2,191 (*£4,347*) and surplus on liquidation of subsidiary £14,971 (*nil*), making £130,073 (*£132,694*). To depreciation £22,535 (*£22,640*), audit fee £485 (*£465*), directors' fees £1,350 (*£1,400*), management remuneration £5,950 (*£4,910*). U.K. income tax £19,563 (*£39,130*), U.K. profits tax £12,500 (*£14,000*), Dominion taxation £1,702 (*£1,211*), plant replacement, research and contingencies reserve, taxation on initial allowances in respect of capital expenditure, £14,875 (*nil*), balance attributable to outside shareholders nil (*£833*), retained in subsidiaries £4,375 (*£2,017*), leaving £46,738 (*£46,088*). To additional provision for deferred repairs and rehabilitation of plant and buildings £2,500 (*£2,500*), to plant replacement, research and contingencies reserve £8,000 (*£20,000*), to general reserve £10,000 (*same*). Dividend, preference, old shares £4,950 (*same*), new shares £1,513, Ordinary dividend 7%, old shares £7,700 (*same*), new shares £642 (*nil*), leaving £28,531 (*£17,098*) carried forward.

John Thompson

For 1949, consolidated trading profit was £837,377 (*£721,530*), reserve for deferred repairs (decrease) £16,267 (*£28,177*), investment income £22,306 (*£25,019*), interest £537 (*£2,535*), working £876,487 (*£777,261*). To depreciation £115,445 (*£83,282*), depreciation reserve £50,000 (*nil*), staff pensions £30,424 (*£26,994*), audit fee £2,260 (*£2,041*), sundry expenses £462 (*nil*), bonus issue expense £1,415 (*nil*), reserve for future publicity £5,000 (*nil*), formation expenses and cost of trading rights written off £562 (*nil*), taxation £358,745 (*£330,017*), leaving £312,174 (*£334,927*). With £458,467 (*£370,930*) brought in, profit on sale of plant £1,241 (*nil*), adjustments in respect of previous years £530 (*£17,154*), making £772,412 (*£723,785*). To loss on realisation of investments £2,806 (*£5,477*), dividends £79,447 (*£77,091*), investment reserve £55,325 (*£1,050*), contingencies £3,000 (*£5,000*), general reserve £75,000 (*£175,000*), bad debts reserve nil (*£1,700*), leaving £556,834 carried forward.

Kalgoorlie Electric P. & L. Corporation

Net profit for 1949, after all charges including taxation and taxation relief in respect of initial allowances was £21,422 (*£21,586*). U.K. taxation less relief in respect of initial allowances £5,215 (*£2,235*) and relief for Australian taxation was £3,128 (*£6,770*). Ordinary dividend of 7% absorbs £7,219 (*same*), to depreciation reserve £6,000 (*£10,000*), to general reserve £2,117 (*£4,500*), to capital reserve towards eventual redemption of Debenture Stock issued January last, £7,000 (*nil*), commitments outstanding for purchases of plant and machinery not delivered by end of the year £226,000 (*£170,000*), and there is £9,312 (*£10,228*) carried forward. The transfer to Depreciation Reserve is reduced because a valuation of properties, plant, machinery, etc., during the years shows the balance sheet value is very considerably below present value.

Waite and Son

Profit for the year to March 31, after all charges, including tax, was £19,301 (*£8,699*), but £16,771 had to be provided for depreciation of stock-in-trade in previous year which necessitated the transfer of £7,000 from general reserve. Dividend for the year is 10% (*nil*). Tax charged on the current year amounts to £13,837.

Dividends Declared

Brecknell, Munro and Rogers. Interim dividend of 10% (*15%*).

British Electric Traction Co. Final Deferred Ordinary dividend 17½%, making 32½% (*50%*) on capital as raised by 200% scrip bonus.

Broadcast Relay Service. Final dividend 5%, tax free making 13% tax free (*same*). Group trading profit £1,007,282 (*£865,271*). Net profit, after tax, £460,640 (*£338,711*).

Dewhurst and Partner. Interim dividend of 10% (*same*).

International Combustion (Holdings). Interim dividend of 5% on capital increased by 150% share bonus. The board points out that this does not necessarily mean that there will be any alteration in the dividend for the year.

Commercial Information

CONTRACTS OPEN

HOME

June 23.—Rayleigh U.D.C. Electrical wiring of 55 houses. H. P. Turner, Engineer and Surveyor, Council Offices, Rayleigh.

June 24.—Stretford T.C. Lighting of drawing office and lecture room at Stretford Technical College by installation of fluorescent tubes. A. H. Perry, Borough Surveyor, Town Hall, Stretford. Deposit £2 2s.

June 26.—Ilford T.C. (a) Supply of 118 sodium lanterns, control gear and lamps, (b) supply, erection and connection of 118 25 ft. reinforced concrete columns for trunk road, Woodford Avenue. K. F. B. Nicholls, Town Clerk, Town Hall, Ilford. Deposit £2 2s. (See our June 15 issue.)

June 26.—Romford T.C. Electrical installation to 40 houses on Masefield Crescent estate. Borough Engineer and Surveyor, Town Hall, Romford.

June 27.—Alcester R.D.C. Wiring 33 houses in various parishes. Surveyor, Council Offices, Alcester.

June 28.—Northampton R.D.C. Electrical installation to 72 houses in course of erection. R. J. Miller, Architect, Cheyne Walk, Northampton.

June 29.—Belfast T.C. Electrical installation in Central Library, Royal Avenue. F. W. Parkinson and Partners, Consulting Engineers, 6 Murray St., Belfast. Deposit £3 3s.

June 30.—Farnborough U.D.C. Street lighting columns, lanterns, chokes, capacitors, time switches for approx. 130 lamps. D. Stewart Jones, Clerk to the Council, Town Hall, Farnborough.

June 30—Maidenhead T.C. Mercury vapour street lighting installation to Group A standard in Bridge Road (A4 trunk road): (*a*) provision and erection of reinforced concrete columns; (*b*) supply and erection of lanterns and fittings including wiring. Borough Engineer, C. T. Read, 14 Cranford Rise, Maidenhead. Deposit £2.

June 30.—Morpeth T.C. Electrical installation for 57 houses at Spelvit Lane. F. K. Perkins, Borough Surveyor, 36 Bridge St., Morpeth.

June 30.—Penicuik T.C. Electrical work for 32 houses on Eastfield site. Morham and Brotchie, Quantity Surveyors, 29 Hanover St., Edinburgh.

June 30.—N. Scotland H.E. Board. 32 miles of 33 kV and 58 miles of 11 kV single circuit wood pole overhead lines and 77 miles of low voltage lines between Huntly and Ballater in Aberdeen county. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Deposit £1 1s. (See our May 25 issue.)

July 1.—Grantown-on-Spey T.C. Electrical work for 20 houses. Architect, A. Cattanach, The Laurels, Kingussie. Deposit, £1 1s.

July 1.—Rhondda U.D.C. Erection of duplicate set of pumps, electrically driven, with capacity of 21,000 gal per hour against a total head, including friction of 452 ft. Water Engineer, Water Offices, Pentre, Rhondda. Deposit £1 1s.

July 3.—N. Scotland H.E. Board. Installation of new equipment and conversion of existing equipment (mainly radio) in consumers' premises affected by change of supply from d.c. to a.c. in Perth city area. Kennedy and Donkin, 244 Bath Street, Glasgow C2.

July 3.—Rochford R.D.C. Installation of electricity at 67 dwellings in Rochford, Great Wakering and Barling Magna. Engineer and Surveyor, Council Offices, Rochford. Deposit £1.

July 3.—Wokingham R.D.C. Internal wiring for houses Nos. 1-12, Reading Rd., Finchampstead. Housing Manager, Council Offices, Shute End, Wokingham, Berks.

July 5.—Northfleet U.D.C. Installation of an unchokeable 4 in. pump and electric motor at the sewage works. W. G. Futcher, Clerk, Council Offices, Northfleet.

July 8.—Ashton-in-Makerfield U.D.C. Supply of materials for electrical installation in 62 houses on Bryn Station site. Surveyor, Town Hall, Ashton-in-Makerfield.

July 8.—Mallow. Electrification of creamery premises at Mourne Abbey for Mourne Abbey Co-operative Creamery Ltd. Contract includes wiring for light and power and supply of motors and control gear. Creamery Offices, Mourne Abbey, Mallow, Co. Cork.

July 10.—Frimley and Camberley U.D.C. Supply, erection and putting into service 102 tungsten filament street lamps. Engineer and Surveyor, Municipal Buildings, Camberley. (See our June 15 issue.)

July 17.—Waterford C.C. Electrical services comprising lighting, cooking, laundry, sterilising and associated hospital equipment at Ardkeen Sanatorium. Fourteen major buildings, covering 20 acres. Engineer, N. Matthews, 104 Grafton St., Dublin. Deposit £15 15s.

July 24.—Bootle. Manufacture and erection of pumping plant in Hapsford Road Pumping Station, including two sets of electrically driven unchokeable pumps, each capable of 1,000 gallons per minute, for Rimrose Brook Joint Sewerage Board. Engineer to the Board, G. M. C. Taylor, Artillery House, Artillery Row, Westminster, S.W.1. Deposit £5.

July 31.—Thame U.D.C. Two electrically driven vertical spindle borehole type pumps with ancillary equipment. Engineers: John Taylor and Sons, Artillery House, Artillery Row, Westminster, S.W.1.

Aug. 12. — Southport T.C. Supply and erection of five sets of electrically driven (automatically operated) axial flow pumps of a total capacity of 31,250 gallons per minute. Borough Engineer, Town Hall, Southport. Deposit £2 2s.

No date stated.—Cornwall C.C. Electrical services and heating services for new infants schools (160 pupils each) at Newquay and Saltash. S. Gregson, County Architect, County Hall, Truro. Deposit £3 3s. for each school. (Applications by June 30.)

No date stated.—Ennerdale R.D.C. Electric wiring of 310 houses. Surveyor, Council Chambers, Cleator, Cumberland.

No date stated.—Morpeth T.C. Electrical installation in 57 houses in Spelvit Lane, Morpeth. Borough Engineer, F. K. Perkins, 36 Bridge St., Morpeth.

No date stated.—Seaton Valley U.D.C. Installation of electricity in 62 houses on Village Rd. estate, Cramlington. Surveyor, T. W. Burgess, Council Offices, Seaton Delaval.

No date stated.—Perth T.C. Electrical work for erection of 82 flats at Letham. Burgh Surveyor, 16 Tay Street, Perth.

No date stated.—Willesden T.C. Applications for inclusion on list of approved contractors for (1) heating, steam services, laundry and kitchen equipment; (2) electric light and power installations should be made before June 26. J. Morris, Borough Engineer and Surveyor, Town Hall, Dyne Rd., Kilburn, N.W.6. (See our June 15 issue.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

July 5.—Brussels. Twenty-four lots of telephone equipment and accessories. Regie des Telegraphes et des Telephones de Belgique, Brussels. B.o.T. (Ref. CRE (IB) 565327/50).*

July 11.—Montevideo. Supply of telephone switchboard indicator lamps: 6,000 type 1 (60 V); 3,000 type 1 (24 V); 4,000 type 2 (60 V); 2,000 type 2 (24 V). Type 1 for Siemens equipment, type 2 for Autelco. B.o.T. (Ref. CRE (IB) 55666/50).*

July 14.—Manila. One hydraulic turbine and governor; and/or one generator, switchgear and station service equipment, supervisory control equipment, power transformer, substation equipment and line materials, for Talomo River No. 2A Hydro-electric Project. Office of the National Power Corporation, 4th Floor, Natividad Building, Escolta, Manila.

July 19.—Queensland. 6·6kV 125 kW alternator complete with automatic voltage regulator for Longreach Shire Council. State Electricity Commission, Queensland. B.o.T. (Ref. CRE (IB) 53102/50).*

July 20.—Montevideo. Four electric pump groups, each comprising one centrifugal pump with an output of 150 m.m. per hour at a manometric height of 25 metres, including a plunger piston foot suction valve with retention valve, cut-off valve and manometer. Usinas Electricas y Telefonos del Estado. B.o.T. (Ref. CRE (IB) 55664/50).*

July 27.—Johannesburg. Tender No. C1675: for one 20 kV switchboard comprising 6 units; one 6·6 kV switchboard comprising 8 units; one 6·6 kV switchboard comprising 11 units; one 6·6 kV switchboard comprising 9 units; one 380/220 V busbar mounted H.R.C. fuse-switchboard comprising 26 units; one 380/220 V busbar mounted H.R.C. fuse-switchboard comprising 25 units; one 380/220 V busbar mounted H.R.C. fuse-switchboard comprising 6 units; one 20,000/6,600 V transformer; one 6,600/400/231 V transformer. Chief Stores Superintendent, South African Railways, Room 207, Park Chamber, Rissik Street, Johannesburg.

July 29.—Karachi. Supply of 23 broad gauge (5 ft 6 in.) main line express and goods diesel electric locomotives for N.W. Railway (Pakistan). Commercial Secretary, High Commissioner for Pakistan, Supply and Stores Dept., 40 Lowndes Square, S.W.1. Reference SS.4190.

Aug. 1.—Karachi. Six 500 kW diesel alternators and two 1,000 kW diesel alternators, together with heat exchangers and spares for power station at Chittagong. Dept. of Supply and Development, Government of Pakistan, Karachi. B.o.T. (Ref. CRE (IB) 56054/50).*

Aug. 1.—Tasmania H.E. Commission. Supply and delivery of five 90 in. diameter automatic self-closing valves for Tungatinah pipelines. Agent-General for Tasmania, 457 Strand, W.C.2. Fee £2 2s. Advertised in this issue.

Aug. 3.—Western Australia. Pumps, motors and electrical gear for two pumping stations on the Wellington Dam to Narrogin pipeline. Agent General for Western Australia, Savoy House, 115-116 Strand, W.C.2.

Aug. 9.—Queensland. One switchboard, 6,600 V, 3-phase, 50 c/s operating with an unearthed neutral complete with all equipment and mounted, for Longreach State Electricity Commission, Queensland. B.o.T. (Ref.) CRE (IB) 55450/50.*

Aug. 23.—Wellington. Separate quotations for the supply and delivery of five 11 kV control and relay boards are invited by N.Z. State H.-E. dept. Quotation S.C. 2016 is for a 10-panel control and relay board for the

Your Queries — Answered

"Polarcold" refrigerators, makers of? T.E. — Dane Timber Mills, Ltd., Spindle St., Congleton, Cheshire. (18257)

"Timemaster" battery clocks, makers of? T.E.—Anglo Time Corpn., Ltd., Brookhouse Mills, New Mill St., Blackburn. (18261)

"Keith" toasters, makers of? T.E.—Formerly made by Keith Electrical Industries, Ltd., of Thorburn St., Manchester 13, but we understand these have now been taken over by Roevac Metal Pressings, 329 Stretford Rd., Manchester 15. (18264)

"Red" irons, makers of? T.E.—Radio Electric Development Co. (Crewe), Ltd., Walthall St., Crewe. (18268)

"E.S.B. Minor" salt baths, makers of? A.I.—Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, Watford-by-Pass, Watford. (18273)

Rapid action glass tumbler dryer, capacity 30 c. ft., makers of? W.—H. R. Noble, Ltd., 291 Green Lanes, N.13. (18277)

"Zedlok" trunking, makers of? E.R.C.—Mantel Metalworks, Ltd., 50 Stuart Rd., S.E.15. (18283)

"Astoria" washing machine, makers of? C.W.—Coffield Washer Co. of Canada; spares should be obtainable from Southern Electrics, The Newlands, Wallington. (18296)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Hawera substation; S.C. 2017, a 7-panel control and relay board for the Wellsford substation; S.C. 2018, a 9-panel control and relay board for the Hangitiki substation; S.C. 2019, a 7-panel control and relay board for the Tauranga substation; and S.C. 2020 is for an 11-panel control and relay board for the Patutani substation. Stores Manager, State H.E. Dept., Wellington.

Sep. 1.—Montevideo. Telecommunication measuring equipment. Direcion General de Communicaciones, Montevideo, Uruguay. B.o.T. (Ref. CRE (IB) 54231/50).*

Sept. 3.—Cairo. Supply and erection in the petroleum refinery at Suez of 3 diesel-alternators of 250 kV each with switchboards, exciters, etc. Chief Inspecting Engineer, Egyptian Govt., 41 Tothill St., S.W.1. Payment £3 1s. 6d.

Sep. 13.—Victoria. Supply of 66 kV to 22 kV transformers in accordance with specification No. 50-51/3. Offices of Agent General for Victoria, London.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Daystar. 686,903. Class 9. Insulated electric wires. J. Day and Co. (Derby Works) Ltd., Harrow Manor Way, Abbey Wood, London S.E.2.

Erie. 670,304. Class 9. Electrical resistances, condensers, potentiometers and volume controls. Erie Resistor Ltd., 2 Carlisle Road, The Hyde, Hendon, London N.W.9.

LPA with design. B686,250. Class 9. Electrical apparatus and instruments, etc. Light and Power Accessories Co. Ltd., Tudor Works, River Park Road, Wood Green, London N.22.

Locomotors Ltd. with design. 682,291. Class 9. Electrical apparatus and instruments, etc. Locomotors Ltd., 154 Grosvenor Road, Westminster, London S.W.1.

Novaglim. B682,318. Class 9. Electrically illuminated signs. Nova Sign Co., 2 Saville Place, Newcastle-on-Tyne 1.

Trade Wind. 685,011. Class 11. Installations and apparatus for heating, drying and ventilating and apparatus incorporating heating elements for defrosting and de-misting. World Radio Ltd., Trico House, Edgware Road, London, N.W.2.

PRICES OF CABLE METALS AND OTHER MATERIALS

(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	186 0 0	£180 0 0
Delivered in 2nd and 3rd month after order	187 10 0	—
Delivered in 4th, 5th and 6th month after order	189 0 0	—
LEAD, good soft pig (foreign)	96 0 0	96 0 0
" " " " "English" quality	97 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99-99.75%) (Cash)	593½-594	—
" (3 months)	595 -595½	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	127 10 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	43 5 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

CONTRACTS PLACED

Margate T.C. Supply and erection of decorative lighting equipment, supply of 9,900 lamps. H. E. Walkden (Kent) Ltd., £4,700, £1,000. Installation of 47 "Paisley" lamp standards in Sea Road and Drive, Westgate-on-Sea, and lighting equipment consisting of 47 mercury discharge lamps. Revo Electric Co., Ltd.

Sunderland E.C. Replacing gas lighting with electricity in schools. Thomas Street county school, Hendon school and James William Street school. Electrical Development Co. Ltd., £1,290, £1,375 and £1,130 respectively. Diamond Hall school, Moorschool and Bishopwearmouth school. Gee and Brown Ltd., £1,405, £629 10s. and £697 10s. respectively. Hudson Road school. B. French Ltd., £1,762. With consultant's fees the work will cost £8,830.

L.C.C. Installation of wiring and fittings for electricity in 268 flats at Duke's Court and York Street, Westminster, and Shelton Street, Holborn. Arthur Scull and Son, Ltd., £5,756 17s. 1d. (accepted). T. Wescott and Sons, £6,525 13s. 2d. Electric Contracts (London), Ltd., £7,267 15s. 6d. Barlow Bros. and Co., £7,293 1s. Powerlite Electrical Installations, Ltd., £8,371 17s. Thorpe and Thorpe, Ltd., £8,473 12s. 6d. City Electrical Co., £8,949 8s. 6d. Holliday and Son (Electrical), Ltd., £9,017. J. H. Plant, Ltd., £9,369 15s. 6d. London Board, £9,800 19s.

Widnes T.C. Supply and erection of 282 lighting columns, 220 sodium cut-off fittings and control gear and 62 3-tube 80-W fluorescent fittings with control gear, Revo Electric Co., Ltd.

TRADE NOTES

Change of Address.—Walkers, electrical engineers, formerly of Causewayside, Edinburgh, have moved to 47 Upper Gray Street.

Dewhurst and Partner Ltd. have opened a branch office covering the Yorkshire area at York House, 21 Park Street, Leeds 1. Tel.: Leeds 26553. The office will be under the control of Mr. W. Woosnam, resident engineer and manager.

A.S.E.E. Guide. The guide to the 12th edition of I.E.E. Regulations for the electrical equipment of buildings is now being prepared. Publication is expected to be made early this autumn.

Holidays.—The East Pilton, Edinburgh, works of Bruce Peebles and Co. Ltd. will be closed from June 30 until July 10.

New Branches.—The Glasgow branch of Brook Motors Ltd. has served the whole of Scotland for many years, but the firm has decided to extend their service to customers in the North of Scotland by opening a further branch at 124 Union Street, Aberdeen. Tel. 21890.

Engineering Centre.—Zwicky Ltd. have arranged to use the Engineering Centre, Glasgow, as a permanent showroom, and now display examples of filters and pumps.

Ceylon Import Control.—Under a new import control notice published in Colombo, import licences will be issued freely for electric wires and cables, lamp bulbs, torch bulbs, and electric lighting accessories and fittings, in respect of easy currency sources, including Hong Kong.

New Factory.—A new factory has been opened at the Queenslie Industrial estate, Glasgow, by Thomas A. Edison Ltd.

BUSINESS PROSPECTS

HOME

Banstead. South-west Metropolitan Regional Hospital Board recommended to approve scheme for re-wiring of fire alarm system and internal telephones at Banstead Hospital. Estimated cost £5,000.

Battle R.D.C. Erection of 10 houses at Bishop's Lane, Robertsbridge. A. H. Neave, 38 Mount Street, Battle.

Birkenhead T. C. Erection of 12 police houses at Prenton Road West. Borough Engineer and Surveyor, Town Hall, Birkenhead.

Brighton T.C. Erection of 17 houses on Parkside estate, Coldean. Borough Engineer and Surveyor, D. J. Howe, 26-30 King's Road, Brighton.

Brighton T.C. Erection of extension of 19,000 sq ft to an existing factory on Hollingbury estate, together with canteen of 7,000 sq ft. D. J. Howe, 26-30 King's Rd., Brighton 1.

Crickhowell R.D.C. Erection of 12 houses. Architects, J. Merton Jones and Son, St. Mary's Chambers, Abergavenny.

Flaxton R.D.C. Erection of 18 houses at Skelton. Architects, Ward, Porteus and Ruddick, 9 Museum Street, York.

Greenwich T.C. Erection of 136 flats on Cherry Orchard housing site, Charlton. Borough Engineer and Surveyor, Town Hall, Greenwich, S.E.10.

Haverfordwest T.C. Erection of 22 dwellings at Jury Lane. Borough Surveyor, 9 Victoria Place, Haverfordwest.

Leeds T.C. Erection of 102 flats at Tinshill Lane, 120 at Moortown (East), 60 at Iveson Drive, Ireland Wood, and 84 flats and terrace houses at Fearnville Rd. City Architect, Priestley House, Quarry Hill, Leeds 9.

Llanfairfechan U.D.C. Erection of 35 houses at Tyddyn Drychin. W. Weldon Roberts, Clerk, Council Offices, Llanfairfechan.

Maidstone R.D.C. Erection of 34 dwellings. Engineer and Surveyor, J. H. Nicholson, Council Offices, 26 Tonbridge Road, Maidstone.

Morecambe and Heysham T.C. Erection of 14 C.I. type houses on Blackberry Hall estate. Borough Surveyor.

Newcastle-under-Lyme T.C. Erection of 49 houses. C. J. Morton, Town Clerk, District Bank Chambers, Newcastle-under-Lyme, Staffs.

Newcastle-on-Tyne E.C. Final plans prepared for primary school on Montagu estate to cost about £144,000. Architects, P. L. Browne, Son and Harding, Pearl Buildings, Northumberland St., Newcastle.

Newcastle-on-Tyne E.C. Erection of primary school to accommodate 560 pupils on Benton Park estate. H. V. Lightfoot, Director of Education, City Education Office, Northumberland Rd., Newcastle 1.

Peterlee. Development Corporation, Sholter Hall, Castle Eden, are to build about 1,000 houses in the new town of Peterlee. Contract arrangements will be made shortly for the first batch of 250 houses.

Rawmarsh U.D.C. Erection of 34 houses on Monkwood estate. A. H. Jackson, Clerk to the Council, Council Offices, Parkgate, Yorks.

St. Austell U.D.C. Erection of 10 houses at Poltair site. H. G. King, Engineer and Surveyor, Municipal Offices, St. Austell.

Stockton-on-Tees T.C. Erection of 54 bungalows at Roseworth. Borough Architect, 28 The Square, Stockton.

Stretford T.C. Erection of 36 flats on Railway Rd. site. A. H. Perry, Borough Surveyor, Town Hall, Stretford.

Swansea T.C. Erection of 44 houses on Penlan estate, Treboeth. Office of Borough Architect, The Guildhall, Swansea.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Avinash Electronic, Ltd., 63 Kensal Rd., W.10. General contractors for, mnfrs. of and dlrs. in all forms of electrical installations and goods, etc. Cap.: £1,000. Dirs.: S. Popkiewicz, Z. S. Sztumpf.

Bristow & Grice, Ltd., National Provincial Bank Chmbrs., Five Ways, Birmingham 15. Mech., elec. and genl. engrs., tool makers, etc. Cap.: £3,000. Dirs.: H. B. Bristow, G. M. B. Grice, H. T. Lucas.

Cinestat Electric Ltd., 15/17 Caxton Street, Westminster, S.W.1. To carry out technical developments in connection with high-speed photography with electronic application to industrial, commercial and scientific statistical problems, etc. Cap.: £100. Dirs.: N. K. Moritz, N. W. Maybank.

A. D. Dench and Co. Ltd., 8 Cressingham Gardens, Sutton, Surrey. To take over business of an electrical engineer and contractor carried on at Sutton by A. D. Dench. Cap.: £2,000. Dirs.: A. D. Dench, Mrs. L. Dench.

Haynes and Fleeson Ltd., 13 Hadfield Street, Manchester 4. Electricians, electrical engineers and contractors, etc. Cap.: £2,000. Dirs.: A. J. Haynes, J. K. Haynes and A. G. Haynes.

Longstreets Radio Ltd., 1 Redland Park, Bristol 6. Manufacturers of and dealers in electrical and mechanical apparatus, and in particular wireless sets, valves, etc. Cap.: £1,000. Dirs.: J. James, K. O. Longstreet.

G. L. Wallis and Son Ltd., Lenelby Works, Lenelby Road, Tolworth, Surbiton, Surrey. Engineers, general electrical installation contractors, etc. Cap.: £1,000. Dirs.: G. L. Wallis (managing director), A. G. Wallis.

White-Ibbotson Ltd., 70 Finsbury Pavement, E.C.2. Electronic, electro-mechanical and mechanical development, etc. Cap.: £3,000. Dirs.: R. C. White, H. Ibbotson.

OVERSEAS

South Africa.—Melatherm (Pty.) Ltd., of P.O. Box 13, Elsburg, near Gormiston, Transvaal, are anxious to get in touch with a U.K. manufacturer of glass-lined tubing which they use in connection with the manufacture of electric fires. A sample of the tubing can be seen at the Board of Trade's Commercial Relations and Export Department, Room 1092, Thames House North, Millbank, London S.W.1 (Victoria 9040, Ext. 2799). Ref. CRE (IB) 56357/50 should be quoted.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Greater London Power Co., Ltd., electrical engineers, 24-30 Gillingham St., S.W.1. Resolution for voluntary winding up passed at meeting on June 5. Mr. A. J. Jenkins of British Electricity House, Great Portland St., W.1, appointed liquidator.

Whitworth's Electro Plastic Co. Ltd., manufacturers of electrical tubular heaters, 7 The Broadway, Guildford. Mr. C. J. K. Boyce, 1 and 2 Holy Trinity Churchyard, High Street, Guildford, appointed liquidator.

Voluntary Liquidation

T. G. Henry Ltd., auto-electrical engineers, 14a Bridge Street, Southport. When creditors were called together recently a statement of affairs showed liabilities amounting to £3,400. Assets were estimated to produce £1,556 and after allowing £41 for preferential claims there were net assets of £1,515, or a deficiency as regarded creditors of £1,884. The issued capital of the company amounted to £815 and, so far as the shareholders were concerned, there was a total deficiency of £2,699.

Registered in September, 1943, with a nominal capital of £2,000, the company acquired a business for a purchase price of £565. Trading was successful for a time and accounts for the year ended March 31, 1948, showed a net profit of £657. Subsequent accounts for the period April 1, 1948, to October 31, 1949, disclosed a net loss of £1,403. In March, 1949, a fire caused considerable damage, assessed at £2,500, which was paid by the insurance company. The incident caused a cessation of business for some weeks with resultant dislocation, and that was submitted as the main reason for the present position.

It was stated that subject to the voluntary liquidation being confirmed, cash claims of £1,728 included in the liabilities would be withdrawn. A resolution passed confirmed the voluntary liquidation of the company with Mr. S. Oliver Henry, of Parkin S. Booth and Co., 5 Rumford Place, Chapel Street, Liverpool, as liquidator, together with a committee of inspection.

First Meeting

West Bromwich Element Manufacturing Co. (Birmingham) Ltd., 283 Bearwood Road, Smethwick, Staffs. Creditors and contributories meetings tomorrow (Friday), at 11.15 and 11.45 a.m. respectively at the Official Receiver's Office, Somerset House, 37 Temple Street, Birmingham.

Dividend

Manchester. W. T. Spencer, electrician, 376 Oldham Road, Newton Heath, Manchester. First and final payment of 8s. per £1 payable at the Official Receiver's Office, 20 Byrom Street, Manchester, tomorrow.

MEETINGS TO NOTE

TUESDAY, JUNE 27

I.E.E. (N. Midland students').—Summer technical meeting. E.L.M.A. Lighting Bureau, 24 Aire St., Leeds. —6.30 p.m.

TUESDAY, JULY 4

I.E.E.—Summer meeting opens at Cambridge.

WEDNESDAY, JULY 5

A.S.E.E. (N. London branch.)—"Light Vision and Lighting." B. H. Carr. The Three Jolly Butchers Hotel, Wood Green, N.22.

AUTOMATIC TELEPHONE & ELECTRIC COMPANY

Another Satisfactory Year

THE annual general meeting of the Automatic Telephone and Electric Co., Ltd., will be held in London on July 11.

The following are extracts from the statement by the chairman, Sir ALEXANDER ROGER, K.C.I.E., circulated with the report and accounts.

The profit before charging taxation amounts to £1,001,440, an increase of £312,056. The group consolidated net profit at £590,232, after charging taxation (£651,890), compares with £356,117.

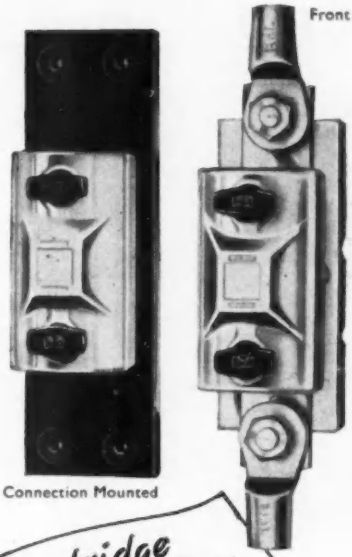
Sales turnover continued at a highly satisfactory level, the division between home and export business being 40% home and 60% export. In 1945 the British Post Office was faced with an enormous programme of rehabilitation of the country's telephone system and the provision of service to a vast number whose demand for the telephone had had to be postponed during the war years.

Within the limits of their powers the B.P.O. have tackled the problem energetically. Unfortunately, however, the Government has considerably reduced the Post Office programme, and little can be done to overtake the arrears of waiting subscribers, who now on published figures exceed 550,000, but whose potential number is probably one million or more. These waiting subscribers could provide the Post Office with well over £6 million of revenue annually, aid the full employment policy which at present is in danger of recession in our industry, and pay a useful return on the investment. Overseas sales have been maintained at the same high level as in 1948. In the radio and line transmission fields a special sales division has been established, and much valuable business is expected to result from the specialised activities of this new branch.

Research

In the research and development laboratory of British Telecommunications Research Ltd., great strides have been made and there has been built up at Maidenhead an enthusiastic team of highly qualified research workers, whose activities keep the group abreast of modern technique.

The world of finance, trade and industry has become a field for the exercise of political theories. Industry has learnt in the school of hard experience that only by joint effort and by making known its views as a whole can it hope to answer the criticism of the opponents of free enterprise—criticism ill-informed or based on distorted statistics, but which, nevertheless, appeals to the gullible. I believe that the far, well-reasoned and public-spirited recommendations issued by the F.B.I. and kindred bodies have done much to show that the motive of those who believe in free enterprise is not the greater private profit of the few, but a fair deal for the invested savings of small and large shareholders and workers alike, centring on the greatest good for the greatest number. In my opinion the cut and thrust of successful competition is impossible except under private enterprise.



Cartridge Fuse-link type

FUSE & LINK UNITS for PANEL MOUNTING

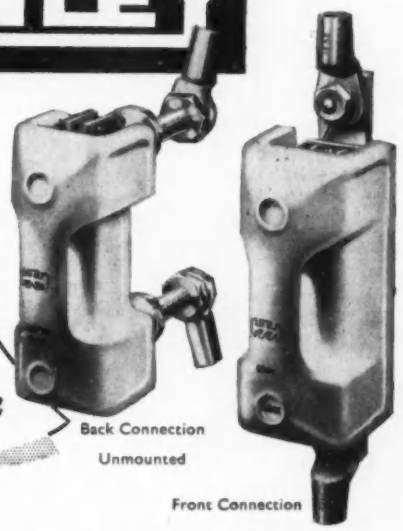
Henley Fuse and Link Units are eminently suitable for use in Distribution Fuse Boards required for large blocks of flats, factories, etc. or for fitting on L.T. switchboards. Two types are available, one suitable for Cartridge Fuse-Links and the other for Rewirable Fuse Carriers.

HENLEY

The Cartridge Fuse-Link type can be supplied suitable for front or back connection, with or without base. The Rewirable Carrier type available also for front or back connection but without base, i.e. unmounted.

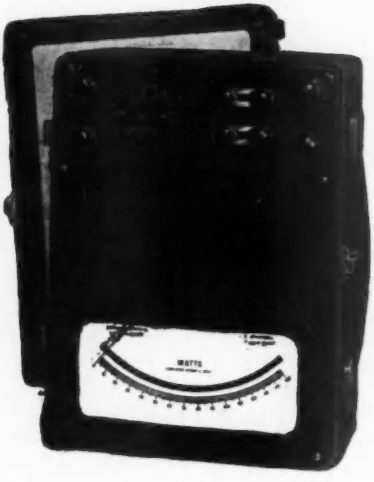
Write for Catalogue 39/1

Rewirable Carrier type



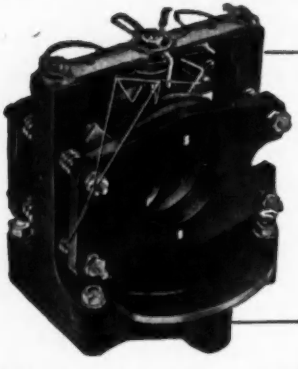
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

FEATURES OF WESTON SUPERIORITY



Weston
DYNAMOMETER SUB-STANDARD INSTRUMENTS

This latest development of the well-known 'Weston' sub-standard Wattmeter is made in three models, each of high-grade dynamometer type, designed for a wide range of precision measurements. The standard series is particularly suitable for meter standardisation and for use as a transfer standard between A.C. and D.C. circuits. Type 2 is recommended for low power factor circuits and Type 3 for higher power frequencies. Similar in size and design, each is housed in a lightweight Bakelite case, with easy reading 6″ scale, knife-edge pointer and anti-parallax mirror. The moving element is fitted with spring-loaded jewels, double magnetic shielding is employed and each instrument carries a certificate of individual performance and guarantee of accuracy to 0.25%. Ample voltage and current ranges are available by simple switching which can be safely applied when the instrument is on load. Model S67 (as illustrated). Size 11″ × 9½″ × 6⅛″. Weight 10 lbs. (approx.)



EXTREME RIGIDITY. An unique feature of these 'Weston' models is the self-contained assembly independent of the casing, thus ensuring extreme rigidity. The whole instrument is housed as one complete unit in an attractive Bakelite case with leather carrying strap and detachable cover. Ample shielding and the absence of metal parts eliminate errors due to external magnetic fields and eddy currents.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX.

Telephone: Enfield 3434 & 1242 - - - Telegrams: Sanwest, Enfield.

DEPOTS AT GLASGOW, NEWCASTLE-ON-TYNE, MANCHESTER AND WOLVERHAMPTON.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

FARNBOROUGH URBAN DISTRICT COUNCIL

SUPPLY OF STREET LIGHTING EQUIPMENT

TENDERS are invited for the supply of street lighting columns lanterns, chokes, capacitors, time switches, etc., for approximately 130 lamps. Copies of the form of tender, specifications and bill of quantities can be obtained from the Engineer and Surveyor, Town Hall, Farnborough, Hants, and must be returned to the undersigned sealed and endorsed, "Street Lighting Equipment," not later than 12 noon, on Friday, June 30, 1950. The Council do not bind themselves to accept the lowest or any tender.

D. STUART JONES,
Clerk to the Council.

Town Hall, Farnborough, Hants. (F 197)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for appointments of:—ASSISTANT SHIFT CHARGE ENGINEERS.

(a) Two at Percival Lane Power Station, Runcorn. Salary: Class "G," Grade 9, N.J.B. Schedule, £571 to £597 per annum.

(b) One at Wallasey Power Station. Salary: Class "D," Grade 9, N.J.B. Schedule, £494 to £510 per annum.

Applicants should have had a good general education and experience in the shift operation of generating plant. The possession of a Higher National Certificate or similar qualification would be an advantage.

The appointments will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme, and will be subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, British Electricity House, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Friday, July 7, 1950. (F 166)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

APPOINTMENT OF GENERAL ASSISTANT ENGINEER, PROTECTIVE GEAR SECTION, TECHNICAL ENGINEERS' DEPARTMENT

APPLICATIONS are invited for the appointment of General Assistant Engineer in the Protective Gear Section of the Technical Engineers' Department at Divisional Headquarters, Newcastle-upon-Tyne.

Applicants should possess qualifications of Graduate I.E.E. standard and have had engineering works training. Experience of electrical protective gear and automatic voltage regulators would be an advantage.

The salary for this appointment will be in accordance with Grade 8, Schedule C, of the National Joint Board Agreement (£457 to £604 per annum) and commence at a point commensurate with qualifications and experience. Superannuation will be in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Room 4/6, Carliol House, Newcastle-upon-Tyne 1, to whom they should be returned to arrive not later than July 8, 1950. (F 167)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER, HINCKLEY

APPLICATIONS are invited for the position of Shift Charge Engineer at Hinckley Generating Station.

Applicants should have had sound technical training and practical experience in the operation and control of steam generating plant and switchgear, and preference will be given to candidates who have the Higher National Certificate or its equivalent.

The salary will be in accordance with Class "B," Grade 7 (£492-£518) of the National Joint Board Schedule, and the post will be superannuable under terms and conditions of the British Electricity Authority's Superannuation Scheme.

Applications should be submitted on the official form of application, which may be obtained from the Divisional Establishments Officer at the under-mentioned address and be returned not later than July 10, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham.
June 13, 1950. (F 168)

BRITISH ELECTRICITY AUTHORITY

INVITE applications for the appointment of ASSISTANT to the SCIENTIFIC ADVISER in the Generation Operation Branch of the Chief Engineer's Department at headquarters in London.

The duties will be concerned with boiler availability, combustion and related problems and the preparation of technical reports thereon. These duties will not involve laboratory work. Applicants should have a recognised qualification in chemistry or chemical engineering. Power station experience is essential and experience of microscopy, particularly photo-microscopy, would be an advantage.

The starting salary will be determined according to the qualifications and experience of the selected applicant within Grade 3 of the N.J.B. Agreement £755 per annum to £1,017 per annum, rising ultimately to a maximum of £1,120 per annum including London Allowance.

The appointment is superannuable and the successful candidate may be required to pass a medical examination.

Application forms may be obtained from D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to him not later than July 8, 1950.

Please quote reference AE/49.
June 22. (F 116)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 1 Sub-Area

APPOINTMENT OF DEVELOPMENT ASSISTANT

APPLICATIONS are invited for the appointment of Development Assistant on the Commercial Officer's Staff at No. 1 Sub-Area Headquarters in Liverpool at a salary of £900 per annum. The salary quoted is provisional and subject to any variation found to be necessary after negotiation with the appropriate staff organisation.

Applicants must be chartered electrical engineers, and have had a wide experience on the commercial side of the electricity supply industry in the development of industrial, commercial and domestic supplies, contracting and consumer service.

The successful candidate may be required to satisfy the Board's medical adviser, and if eligible will be required to contribute to a superannuation scheme.

Application should be made on the form obtainable from the Manager, No. 1 Sub-Area, 24 Hatton Garden, Liverpool 3, and should be completed and returned to him in an envelope endorsed "Development Assistant," so as to be received not later than July 10, 1950.

JAMES RANKIN,
Secretary.
(F 187)

COUNTY COUNCIL OF THE COUNTY OF LANARK

Education Committee

COATBRIDGE TECHNICAL COLLEGE
DEPARTMENT OF ENGINEERING

APPLICATIONS are invited for the following posts, duties to commence as early as possible in session 1950-51:

(1) HEAD OF THE DEPARTMENT OF ENGINEERING

Candidates should have a degree with honours or hold other high qualifications in engineering subjects, and should be specially qualified in mechanical engineering. The person appointed will be responsible to the Principal of the College for the administration of the whole department of engineering.

(2) LECTURER IN ELECTRICAL ENGINEERING

Candidates should have a degree or equivalent qualification in electrical engineering. The person appointed will be required to undertake special responsibilities in connection with electrical engineering courses in the College under the general supervision and control of the Head of the Department of Engineering. Ability to teach mathematics to advanced classes, though not essential, would be an advantage.

Candidates for both posts must be able to undertake lecturing duties to Higher National Certificate standard.

Salary:

(i) A basic salary is paid in accordance with qualifications as follows :—Honours Graduates, £400 to £720. Other Graduates and equivalent, £345 to £610.

(ii) Responsibility payments are made as follows :—Head of department, £175 per annum. Lecturer in electrical engineering, £75 per annum.

(iii) Additional payments are made where timetable duties exceed 30 hours per week.

Applications, in a form to be prescribed by the undersigned, should be lodged within ten days of the appearance of this advertisement.

W. A. F. HEPBURN,
Director of Education.

Lanarkshire House,
191 Ingram Street Glasgow C.1. (F 152)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

STATION CHEMIST—BLACKBURN MEADOWS POWER STATION

APPLICATIONS are invited for the position of Station Chemist at Blackburn Meadows Power Station, Sheffield.

Applicants should preferably hold a university degree in chemistry or its equivalent, but consideration will be given to those holding Higher National Certificate in Chemistry who are pursuing a recognised course of study with a view to final qualification.

The position requires candidates to have had good general analytical experience and a sound knowledge of modern power station practice. Additional experience on problems associated with condenser fouling, corrosion or external boiler deposits would be considered advantageous.

Conditions of service and salary will be in accordance with the N.J.B. Schedule, Class "H" Grade 8, £644-£672 p.a., which should be regarded as provisional and subject to determination by the appropriate organisations.

Applications should be made on forms obtainable from the Divisional Secretary, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelope to be endorsed "Station Chemist."

G. A. VOWLES,
Divisional Controller.
(F 156)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRICT COMMERCIAL OFFICERS

APPLICATIONS are invited for the appointment of Assistant District Commercial Officers in the Woolwich and Bexley Districts of the South Eastern Sub-Area.

Applicants will be required to assist the District Commercial Officer in the commercial organisation and development of the district, and must have sound experience covering :—

Consumer service
Commercial development of electricity supply
Control of service centre, sales and staff
Control of an electrical contracting and maintenance department and staff
Administration and operation of hire and hire purchase schemes

Preference will be given to applicants possessing the Higher National Certificate in electrical engineering.

Pending grading of the posts under the national agreement of the appropriate negotiating body, the provisional salaries will be up to £650 per annum, dependent upon qualifications and experience.

Application forms obtainable from Establishments Officer, 46-47 New Broad Street, E.C.2, on receipt of an addressed foolscap envelope, to be returned by June 30, 1950, quoting reference EST/V.678/T on envelope and all correspondence. (F 158)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

APPOINTMENTS—SUB-AREA CONSUMERS ENGINEER'S DEPARTMENT

APPLICATIONS are invited for the following appointments in the Sub-Area Consumers Engineer's Department, No. 1 Sub-Area, Town Hall, Manchester:

1. ASSISTANT TO SECTION HEAD—POWER SALES

Applicants should have experience in the utilisation of electricity in industry, with particular reference to the industries peculiar to Manchester and district.

Specialised experience in the following will be an advantage :—

(a) Negotiation of electricity supply agreements with large industrial users and knowledge of the economics of private generating plant and public supply.
(b) Preparation of schemes for electric-driving and distribution systems in factories.
(c) Industrial and commercial building heating schemes.

Preference will be given to candidates who are corporate members of the Institution of Electrical Engineers.

The salary will be in accordance with the National Joint Board Schedule, Class " M," Grade 7, i.e. £900-£915-£930 per annum.

2. ASSISTANT POWER SALES ENGINEER

Applicants should have experience in the development of power sales, particularly in relation to lighting, power and industrial heating in factories.

Possession of the Higher National Certificate in electrical engineering will be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class " M," Grade 10, i.e. £727-£739-£751 per annum.

Applications, stating age, qualifications and experience, present position and salary, and the appointment for which application is made, should be received by the Sub-Area Secretary, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, not later than Saturday, July 1, 1950. (F 155)

BRITISH ELECTRICITY AUTHORITY

London Division

GENERATION ENGINEER (OPERATION)

APPLICATIONS are invited for the position of Generation Engineer (Operation).

The salary, which is provisional and subject to negotiation with the appropriate organisation, will be within the range £1,250-£1,750 per annum according to qualifications, experience, etc.

The successful candidate will be required to take full charge of a group of stations of an aggregate capacity of 658 MW.

Applicants should possess sound technical qualifications and be familiar with the operation of modern H.P. plant.

Administrative experience is an essential requirement.

3rd ASSISTANT ENGINEERS—GROUP H.Q.

Applications are invited for the positions of 3rd Assistant Engineers at each Group H.Q.

Candidates must possess good technical qualifications and be familiar with the operational requirements of a large generating station.

The successful applicant will be required to assist the Generation Engineer (Operation) in matters relating to the control of a large group of stations.

Salary within the range £607 19s. to £745 10s. per annum, in accordance with revised N.J.B. Schedule, Class "AX," Grade 5 plus London Allowance.

Applications for the foregoing vacancies, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(F 159)

NORTH EASTERN ELECTRICITY BOARD

EDUCATION AND TRAINING OFFICER

APPLICATIONS are invited for the above post which will be a joint appointment serving both the Board and the North Eastern Division of the British Electricity Authority.

Conditions of service will be in accordance with the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry. The appointment will be on Grade 7 of the N.J.C. Salary Agreement, viz., £705 by £30 to £795 per annum, and the selected applicant will be required to enter the British Electricity Authority and Area Boards' Superannuation Scheme.

Applicants should have had experience such as enables them to formulate and administer training schemes for all grades of employees. Experience on the generation and distribution side of the electricity supply industry will be considered an additional qualification.

Applications in writing, stating age, qualifications, experience and present salary should be forwarded within 14 days to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne 1. Envelopes should be endorsed "Education and Training Officer." (F 175)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at salaries in accordance with the Revised National Joint Board Schedule.

1. DRAUGHTSMAN. Ttr John Power Station, Swansea. Class "G." Grade 12, £468 to £488 per annum.

2. ASSISTANT MECHANICAL MAINTENANCE ENGINEER. Roath Power Station, Cardiff. Class "F," Grade 9, £538 to £560.

3. ASSISTANT ELECTRICAL MAINTENANCE ENGINEER. East Power Station, Newport. Class "F," Grade 9, £538 to £560.

4. SHIFT CONTROL ENGINEER. East Power Station, Newport. Class "F," Grade 10, £510 to £530.

5. ASSISTANT ENGINEER (MECHANICAL). Construction Department, Divisional Headquarters. Class "AX.CX" Grade 5, £579 to £753.

6. DRAUGHTSMAN; JUNIOR DRAUGHTSMAN. Construction Department, Divisional Headquarters. Class "AX.CX" Grade 9, at appropriate points within range £375 to £536.

7. SITE PLANT INSPECTOR. Uskmouth Generating Site. Class "H," Grade 7, £692 to £722.

8. JUNIOR SITE PLANT INSPECTOR. Uskmouth Generating Site. Class "H," Grade 11, £538 to £558.

Candidates for appointments 1 and 6 should have had previous drawing office experience in connection with mechanical plant, and a knowledge of electrical installations and layout would be an advantage.

Applicants for 2 and 3 should have received a full apprenticeship in works engaged in the manufacture of mechanical or electrical plant, whichever is applicable, and had some recent experience in work of a similar nature.

Applicants for 4 should have served a regular apprenticeship and had previous experience in the control room of a modern station.

Candidates for 5 should have a good knowledge of thermodynamics and hydraulics and some knowledge of power station layout.

For 7 and 8 applicants should preferably have received manufacturers' works training and had experience in the erection of power-station plant and ancillary equipment, both electrical and mechanical. These two appointments will be temporary in the first instance, but the successful applicants will be considered for assimilation when the Uskmouth Station is commissioned.

Preference will be given in all the above appointments to those applicants who possess the Higher National Certificate or its equivalent.

The appointments are superannuable under the British Electricity Authority and Area Boards' Scheme, and negotiable through the District and National Joint Boards.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than July 3, 1950, in sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
June 13, 1950. (F 163)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist for ENGINEERS, Post and Telegraphs Department, Gold Coast.

The post is either permanent and pensionable or on contract. If on contract the salary would be fixed between £760 and £1,600 per annum. If permanent and pensionable the salary would be in the scale £660 to £1,300 per annum, point of entry in each case depending on age, qualifications, experience and war service. For contract appointments a gratuity of £150 for each year of service is payable at the termination of service. In addition to the above a cost-of-living allowance of £102 to £180 per annum is payable, the amount depending on the salary.

Candidates must be competent engineers and be Associate Members of the Institute of Electrical Engineers or hold an equivalent qualification exempting them from Parts "A" and "B" of the examinations. They should have had a thorough training in telegraph and telephone engineering with experience in the engineering department of a Posts and Telegraphs Administration on automatic telephony, carrier telephony and underground cable development. They should also have undergone an apprenticeship with subsequent practical experience of power generation and distribution.

Furnished quarters at rents of £80 to £150 per annum and free first class passages each way, each tour, for the officer and his wife, if married, and children up to three in number and up to nine years of age, are provided. Free medical attention. Home leave on full pay at the end of each tour of 18 months at the rate of seven days for each month of resident service. Income tax at local rates.

Intending candidates should write for further particulars and application form to the Director of Recruitment, (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London S.W.1, giving brief details of age, qualifications and experience, as soon as possible, quoting the reference number 27323/3 (F 170)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF PRINCIPAL ASSISTANT TO THE ESTATE AND WAYLEAVES OFFICER

APPLICATIONS are invited for the appointment of Principal Assistant to the Estate and Wayleaves Officer in the Secretary's Department at Area Board Headquarters, Cheetwood Road, Manchester 8.

Candidates must have passed the Final Examination of the Royal Institute of Chartered Surveyors, or possess an equivalent qualification. Thorough experience is required in all matters affecting estate procedure, including negotiations with public and other authorities for the purchasing and leasing of land, and in the valuation of land and buildings. Candidates must be fully conversant with current legislation, and its application.

The salary for the post will be in accordance with Grade 8 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Agreement, i.e. £795 by £35 to £900 per annum. The appointment is superannuable.

Applications, stating age, qualifications and experience, present position and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, not later than Saturday, July 1, 1950. (F 154)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following positions at Kearsley Generating Station, Stoneclough, near Manchester:—

(a) STATION SHIFT CONTROL ENGINEER.
Salary, £646 to £674 per annum, in accordance with Class "K," Grade 10, of the revised N.J.B. Schedule.

(b) SHIFT CHARGE ENGINEER
Salary, £786 to £822 per annum, in accordance with Class "K," Grade 7, of the revised N.J.B. Schedule.

Candidates should preferably have had experience in a large modern generating station and possession of technical qualifications is desirable.

Applications, stating age, present position, and giving full details of qualifications and experience and education, should be received by the Establishments Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than July 1, 1950. (F 186)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of GROUP CANTEEN SUPERVISOR in the East Midlands Division of the British Electricity Authority.

Applicants should have a first-class training in canteen management, covering bulk purchasing of stores, dietetics, hygiene, etc., and should possess City and Guild Certificate No. 150 (Canteen Catering) or equivalent.

The salary for this post will be within Grade 2 (£390-£450 per annum) of the National Joint Council Schedule.

The post will be permanent and the successful applicant will be required to join the Authority's superannuation scheme.

Applications should be made on the appropriate form, which may be obtained from Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and should be returned not later than July 11, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham.
16.6.50. (F 185)

COUNTY BOROUGH OF GREAT YARMOUTH

EDUCATION COMMITTEE

Technical Institute

Principal: J. PARKIN, B.Sc.

REQUIRED to commence duty in September, 1950, or as soon after as possible, full-time INSTRUCTOR qualified to take mainly ELECTRICAL ENGINEERING and INSTALLATION WORK with part-time day and evening students for National Certificates in Electrical Engineering and City and Guilds Installation Certificates.

Salary in accordance with the Burnham (Technical) Report.

Application forms, obtainable from the undersigned on receipt of a stamped addressed foolscap envelope, should be returned not later than Saturday, July 8, 1950.

D. G. FARROW,
Chief Education Officer.

Education Offices,
22 Euston Road, Great Yarmouth. (F 169)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

NORTH WESTERN ELECTRICITY BOARD

No. 6 Sub-Area

ENGINEERING APPOINTMENTS

APPLICATIONS are invited for the following appointments in the No. 6 Sub-Area:—

1. TWO GENERAL ASSISTANT ENGINEERS. Operation and Construction. Sub-Area Headquarters, Castle Green, Kendal.

Candidates should have had a wide experience in the erection of overhead lines and the installation of underground cables, switchgear and substation equipment. A knowledge of estimating, specifications and operational control would be an advantage. Candidates should be Graduate Members of the Institution of Electrical Engineers or possess equivalent technical qualifications.

The salary will be in accordance with Class "G," Grade 13 of the revised N.J.B. Schedule, i.e. £433 to £441 to £449 per annum.

2. ASSISTANT TO THE DISTRICT ENGINEER. Carlisle and Whitehaven Districts.

Candidates should be familiar with the operation and maintenance of urban and rural networks up to 11 kV underground and 33 kV overhead, including substation equipment, protective gear and fault location, and be accustomed to the control of labour. The possession of the National Certificate in Electrical Engineering will be an advantage. The successful candidates will be required to take part in standby duties.

The salaries will be as follows: Carlisle District: Revised N.J.B. Schedule, Class "E," Grade 7, i.e. £579 to £594 to £609 per annum. Whitehaven District: Revised N.J.B. Schedule Class "C," Grade 7, i.e. £531 to £542 to £553 per annum.

3. ASSISTANT ENGINEER. Barrow District.

Candidates should have experience in the operation and maintenance of high and low voltage networks, a knowledge of mains records and the preparation of plans for statutory notices.

The salary will be in accordance with Class "E," Grade 9 of the revised N.J.B. Schedule, i.e. £519 to £525 to £531 per annum.

4. ASSISTANT ENGINEER. Workington and Carlisle Districts.

Candidates should have experience in the operation and maintenance of either overhead or underground networks and some experience of the planning of low voltage extensions.

The salaries will be as follows: Workington District: Revised N.J.B. Schedule, Class "D," Grade 11, i.e. £436 to £444 to £452 per annum. Carlisle District: Revised N.J.B. Schedule, Class "E," Grade 11, i.e. £459 to £467 to £475 per annum.

5. ASSISTANT ENGINEER. Whitehaven District.

Candidates should have experience in the operation and maintenance of rural and urban underground and overhead networks substation layout and general low voltage planning. Experience of change in system of supply would be an advantage.

The salary will be in accordance with Class "C," Grade 12 of the Revised N.J.B. Schedule, i.e. £375 to £384 to £393 per annum.

For posts 3, 4 and 5, candidates should possess technical qualifications up to at least the National Certificate in Electrical Engineering.

The salaries stated are provisional, pending negotiations with the appropriate body.

Applications, stating age, experience and qualifications, present position and salary, should be received by J. E. Shepherd, Esq., M.I.E.E., A.M.C.T., No. 6 Sub-Area Manager, The North Western Electricity Board, Castle Green, Kendal, not later than Saturday, July 1, 1950. (F 174)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the positions of two GENERAL ASSISTANT ENGINEERS (Construction) in the Generation Construction Department.

Applicants must hold the Higher National Certificate in Mechanical and/or Electrical Engineering, or be corporate members of the I.E.E. or I.Mech.E. and should preferably have had workshop training. The posts are located at Nottingham and Leicester Generating Stations.

Salary and conditions of service will be in accordance with the National Joint Board Schedule, Class AX(8), commencing at £437 per annum.

The successful applicants will be required to contribute to the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, should be returned not later than July 3, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham.
June 6, 1950. (F 97)

MIDLANDS ELECTRICITY BOARD

Shropshire and Herefordshire Sub-Area

APPOINTMENT OF FIRST ASSISTANT DISTRICT CONSUMERS' ENGINEER

APPLICATIONS are invited for the above position in the Leominster district of the Shropshire and Herefordshire Sub-Area.

Applicants should have a wide knowledge of the sale and installation of domestic, agricultural, and commercial electrical equipment, and be experienced in electrical contracting work and the maintenance of consumers' supplies. The person appointed will be required to prepare specifications and estimates and will be responsible for the supervision of the practical work. Technical qualifications will be considered an advantage.

The salary of £492 per annum will be provisional and subject to negotiation with such organisations as may be appropriate.

Applications, stating full details of age, experience, qualifications, and present salary, should be forwarded within 14 days to Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(F 183)

MIDLANDS ELECTRICITY BOARD

South Staffordshire and North Worcestershire Sub-Area

APPLICATIONS are invited for the position of ASSISTANT ENGINEER (Construction), Sub-Area Staff.

Applicants should have had wide experience of system changeover work and be conversant with the statutory procedure associated therewith. The duties will include constructional work on cables, switchgear and transformers up to and including 11 kV. Technical qualifications will be considered an advantage.

The successful applicant will be required to work in any part of the Sub-Area, but initially for a period of some five years the work will be principally in the Smethwick district.

The appointment will be in accordance with N.J.B. conditions and the provisional salary of £646 will be subject to negotiation.

Applications, stating full particulars of age, education and experience should be forwarded within fourteen days to : Mr. T. G. Keeler, Manager, South Staffs and North Worcs Sub-Area, Midlands Electricity Board, Toll End Road, Tipton, Staffs.

A. STEPHENS,
Secretary.
(F 184)

ALUMINIUM WIRE AND CABLE CO. require two fully qualified ELECTRICAL ENGINEERS with a knowledge of overhead transmission lines for developing and extending the use of aluminium conductors.

Applicants must be prepared to travel abroad if required and should preferably be 35-45 years of age. They would work from the Company's London Sales Office.

Write for application forms to Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, London, W.C.2, quoting D.181/50-A, which must be returned completed by July 31, 1950.

(F 176)

AN interesting opportunity exists for a young and fully qualified ELECTRICAL ENGINEER with knowledge of electronics in connection with servo mechanism development for aircraft.—Write to Mr. G. Orloff, Chief Designer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 50)

CHARGE ENGINEERS

POWER STATION CHARGE ENGINEERS urgently required by major oil company for service in the Middle East. Must hold at least Higher National Certificate in Electrical Engineering and have had not less than three years' experience in the operation of large modern steam power stations with thorough knowledge of the routine operation of water-tube boilers, turbo-alternators, E.H.T. switchgear and auxiliary plant. Present position in this country should be not less than Grade 8a, Class "H" or Grade 9, Class "G" on N.J.B. Scale. Age not over 38 years. Married accommodation available. Commencing salary not less than £900 per annum, plus generous allowance in local currency. Free passages out and home; free medical attention, kit allowance, good leave arrangements. Pension scheme.

Write, giving age, personal particulars, and full details of qualifications and experience, quoting Dept. F.189 to

Box 2550, at 191 Gresham House, E.C.2. (E 284p)

CHIEF DRAUGHTSMAN required by well-established switchgear manufacturers transferring their works to South Devon. He would be required to take charge of 4/5 draughtsmen engaged on Medium Voltage Metalclad Switchgear Contracts, and must have a good working knowledge of H.R.C. Fused Switchgear and Oil Circuit Breakers. Required at N.W. London Works for approximately 4 months before transfer. Only first-class men need apply. Good salary and excellent prospects to the right man.
Reply to Box No. 1395, Electrical Times.
(F 102p)

ABERDARE CABLES, LTD., Aberdare, require immediately PAPER CABLE ESTIMATOR to handle foreign enquiries and tenders. State age, experience and salary required. (F 128)

AIR MINISTRY have vacancies for DESIGNERS/DRAUGHTSMEN in the Designs Branch of the Works Department for high-class work in the following fields: Mechanical and Electrical Engineering. The work includes design for London Airport. Salaries are on ranges up to £750. Starting pay according to age and qualifications.—Applications, stating age, qualifications, previous appointments and salary required should be sent to Air Ministry, S.2(h), Cornwall House London S.E.1. It is regretted that applications of candidates not called for interview cannot be acknowledged. (F 21)

APPLICATIONS are invited from senior and medium DRAUGHTSMEN with good practical training for work in the fields of mechanical and radio engineering at the Research Laboratories of The General Electric Co., Ltd., North Wembley, Middx. Men with Higher National Certificate or equivalent will be preferred. Details of age, experience and qualifications should be sent in writing to the Personnel Officer. (F 59)

ASSISTANT OVERHEAD LINE ENGINEER for Consulting Engineers Office in Uganda. Applications are invited from men between the ages of 25 and 35 years for the position of Assistant Overhead Line Engineer in Consulting Engineers' Office in Uganda.

Applicants should have a University Degree in Electrical or Mechanical Engineering, and should have had experience in the design and construction of overhead lines, both of steel tower and wood pole type, and have a knowledge which would fit them for practical supervision of the construction of such work.

Applicants should preferably have served some kind of apprenticeship either in the works of one of the leading electrical manufacturers in this country or on the outdoor construction of overhead lines.

Applications will be considered from single men or from married men, who are willing to proceed to Uganda in advance of their wives, as it is not possible to arrange suitable accommodation for married men and families at the present time, owing to the acute shortage of houses.

Local leave is granted on full pay at the rate of 14 days per annum, non-accumulative, and vacation leave on full pay after 2½ years' service at the rate of 5 days per completed month of resident service. Free passages are granted on first appointment and for home leave. A kit allowance of £30 would be made to assist in purchasing the necessary tropical kit.

Applications should be sent to Box No. 1417, Electrical Times, giving a full resume of technical training and experience, and accompanied by copies of recent testimonials, so as to be received not later than the 30th June, 1950. (F 164)

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION. Applications are invited for the appointment of an ASSISTANT to the Association's Rural Electrification Officer.

Applicants should have had training and experience in the electricity supply industry and possess a knowledge of electro-agricultural applications. Alternatively, applications will be considered from persons with an agricultural background and training, possessing at the same time electrical knowledge and experience. Membership of the Institution of British Agricultural Engineers will be an advantage.

Salary depending upon training and experience will be at the rate of £500 to £650 per annum.

Applications, stating age, education, training and experience should be submitted within 14 days of the date of appearance of this advertisement, to V. W. Dale, Esq., General Manager and Secretary, British Electrical Development Association 2, Savoy Hill, London W.C.2. (F 180)

Merz and McLellan
Esher, Surrey
have a vacancy for a
MECHANICAL DRAUGHTSMAN.
Applicants should have experience on plant and pipework layout preferably relating to thermal power stations. Salary dependent on qualifications. A.E.S.D. rates minimum. Pension scheme.
Apply, stating age and full details of training and experience to
'Milburn,' Esher, Surrey (F 144p)

BUYER. A vacancy has occurred for a television, radio and electrical buyership with James Howell and Co. Ltd., Cardiff. Applicants with departmental store experience preferred.—Apply in writing to the General Manager, Messrs. James Howell and Co. Ltd., Cardiff. (F 173)

CONTRACT ENGINEERS required by cable makers experienced in suspension and underground cables and power station installation or overhead wire erection.—Apply, stating age and salary required, to Box No. 1425, Electrical Times. (F 189)

CONTRACTS MANAGER required by Electric Cable Manufacturers to take full control of Installation Contracts Department. Must have experience in 33kV cable laying and power station contracts and be capable of organising and controlling entire department including estimating, technical correspondence, costing and outside staff.—Apply, in writing, stating age, qualification, experience and salary required, to: Box No. 1415, Electrical Times. (F 153)

DESIGNER DRAUGHTSMAN required for the Design and Development Laboratory of an engineering company of international repute, in London. Applicants must possess Higher National Certificate or equivalent qualifications, and have a practical experience of plastic moulds, small special-purpose machinery, press tool work, and general machine tool knowledge.—Apply, stating age, qualifications, and experience, to Box No. 1431, Electrical Times. (F 192)

DRAUGHTSMAN required, preferably experienced in electrical switch and control gear. Salary commensurate with experience.—Applications in writing, to: Managing Director, Belmos Co. Ltd., Bellshill, Lanarkshire. (F 101)

DRAWING-OFFICE PERSONNEL, men and women, are required by the Research Laboratories of The General Electric Co., Ltd., North Wembley, Middx. Vacancies exist both for mechanical and electrical draughtsmen, and some experience on the drawing board, plus workshop training, is essential. Trainees cannot be considered.—Applications should be sent to the Personnel Officer and should contain details of age and record. (F 149)

ELECTRICAL DRAUGHTSMEN, seniors and juniors, required for long programme of work on oil refineries and chemical plants. Opportunities for good men. Pension scheme. Five-day week, with overtime as required. Salary commensurate with ability.—Write, stating age, qualification, experience, and starting salary to Chief Engineer, E. B. Badger and Sons (G.B.), Ltd., 40 Parkgate Road, Battersea, London S.W.11. (F 58)

ELECTRICAL ENGINEERING STORES ASSISTANT required London wholesale depot. Would train suitable applicant.—Box No. 1377, Electrical Times. (F 66)

ELECTRICAL ENGINEERING DRAUGHTSMAN required, with good practical and technical works' experience including e.h.t. and l.t. distribution, a.c.-d.c. motors and control gear, circuit diagrams and lighting installations. Candidates should be of Higher National Certificate or City and Guild standard and aged under 35.—Write, fully, in confidence, to: E.P. Dept., Michelin Tyre Co. Ltd., Stoke-on-Trent. (F 193)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (*a*) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (*b*) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2593, at 191 Gresham House, E.C.2. (E 415)

ELECTRICAL ESTIMATING AND COSTING ENGINEER required by large contracting firm in Glasgow. Successful applicant's main responsibility will be the costing and detail invoicing of transmission lines, power and lighting contracts, and time and material jobs.—Apply, stating age and salary required, and giving full details of electrical experience.—Box No. 1429, Electrical Times. (F 191)

EXPERIENCED ELECTRICAL LAYOUT DRAUGHTSMEN urgently required. Knowledge of aircraft electrics preferred but not essential.—Apply, stating age and details etc., to Staff and Labour Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. (F 96)

INTERESTING and progressive position exists for ELECTRICAL DESIGN DRAUGHTSMAN in rapidly expanding company. Experience on light, relay and electro-magnetic components would be an advantage.—Apply to Mr. G. T. Atkins, Electrical Engineer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 49)

JUNIOR DRAUGHTSMAN required. Excellent opportunity of gaining first-class experience in an important branch of the electrical industry. West London area. A.E.S.D. London rate.—Write full details of experience to Box No. 1391, Electrical Times. (F 94)

The Brush Electrical Engineering Co., Ltd., Loughborough
have vacancies in their Sales Department for ENGINEERS capable of preparing tenders for one or more of the following: Electric motors, Alternators, Switchgear, Transformers.

Minimum qualifications are: Technical education to National Certificate or equivalent standard, good general engineering training and at least two years' experience of tendering one of the above products.

Applications, in writing, to state age, experience and salary, to
Central Labour Department (F 143p)

IMPERIAL CHEMICAL INDUSTRIES LIMITED invite applications for the position of JUNIOR SHIFT ENGINEER for Boiler House control duties in the company's Weston Point Power Station, Runcorn, which has an installed capacity of 100 MW. Applicants, who should be between the ages of 25 and 30 years, should have had a sound practical training in mechanical engineering, hold a Higher National Certificate in Mechanical Engineering, and preferably should have had some experience of the operation of large modern water tube boilers. Commencing salary £550 p.a. Successful candidates will be required to join the company's superannuation scheme and to pass a medical examination.—Applications, stating age, qualifications and giving full particulars of training, experience and position held, should be sent to: Staff Manager, Imperial Chemical Industries Limited, General Chemicals Division, Cunard Buildings, Liverpool 3, quoting EI. 7. (F 177)

JUNIOR ELECTRICAL ENGINEERS are required for the development and design of television camera and associated equipment at Marconi's Wireless Telegraph Co. Ltd., Chelmsford. Salary £350-£550 p.a. SENIOR ENGINEERS with research or development experience in this field also required. Salary £600-£800 p.a.—Send full details quoting reference 323a to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (F 103)

LABORATORY MECHANIC required for electrical laboratory in south-west London for mechanical and electrical work on the construction of experimental equipment; should be able to wire from circuit diagrams.—Box No. 1395, Electrical Times. (F 108)

LANCASHIRE firm has following vacancies in works and sales sides of power line insulator department. Applicants should not be deterred by lack of experience of insulator manufacture or sales; it is appreciated that training will probably be required in all cases. The first 12 months of any appointment will be considered a probationary period.

(1) ELECTRICAL ENGINEER initially for the position of deputy to the departmental manager. Age 28-35 years. Qualifications: Degree in electrical engineering. Corporate membership of I.E.E. College or similar apprenticeship. Should hold position of some responsibility in production and manufacturing side of large organisation and be familiar with modern methods for control of manufacturing efficiency.

(2) JUNIOR ENGINEERS (two vacancies) as technical assistants in works. Age 23-30 years. Qualifications: Higher National Certificate. Continuance of technical education will be an advantage. Principal duties at commencement will be of an investigational nature into various aspects of production or development of the product from the production, design and testing points of view. Successful applicants may be given openings on the manufacturing side later.

(3) ELECTRICAL ENGINEER for the position of deputy to the head of the insulator sales section. Age 28-35 years. Qualifications: Degree in electrical engineering. Corporate membership of I.E.E. College or similar apprenticeship. Should hold position of some responsibility in internal sales side of large organisation, preferably with experience of handling specifications issued by consulting engineers and electrical power authorities.

(4) JUNIOR ENGINEERS (two vacancies) as internal technical sales assistants. Age 23-30 years. Qualifications: Higher National Certificate, though in exceptional cases an ordinary certificate or lower age will be considered. Previous sales experience and ability to handle correspondence is necessary.—Box No. 1405, Electrical Times. (F 124)

REPRESENTATIVES required for London area, North of England and Scotland. To have good personality and comprehensive up-to-date knowledge of switchgear, up to 132 kV. State previous experience, qualifications, age, and salary required.—Apply: Personnel Manager, Messrs. Cooke and Ferguson, Ltd., South Street, Openshaw, Manchester 11. (F 38)

REVO ELECTRIC CO. LTD., require ADDITIONAL SALES REPRESENTATIVES in the London area. Applicants should be 28-35 years of age and must have had actual sales experience and good electrical background. The possession of a car would be an advantage. The position is permanent and offers excellent opportunities for advancement. Apply, in writing, giving full details of experience and salary required to Manager, Revo Electric Co., Ltd., 30-31 Great Queen Street, Kingsway, London W.C.2. (F 179)

PLANNING AND METHODS ENGINEER required. Age 23-35. Preferably with experience of small electro-mechanical parts.—Write full particulars and salary required to Box No. 1389, Electrical Times. (F 93)

PRODUCTION control. SENIOR ASSISTANT required, able to control production, planning, scheduling, machine shop loading, assembling and progressing. Experience in light electrical engineering essential. Interesting work, with prospects for the right man. Five-day week. Canteen. West London district.—Write full particulars and salary required to Box No. 1387, Electrical Times. (F 92)

SALES EXECUTIVE of highest calibre required by a large Electrical Capital Goods Manufacturer. Applicants must be well connected. Position carries a high rate of remuneration. Full details, which will be treated in strictest confidence, to Box No. 1419, Electrical Times. (F 171)

SALES REPRESENTATIVES required in all areas for marketing an entirely new 5-amp switch of revolutionary design and phenomenal performance. Previous experience and sound established connections essential. Good salary and commission, plus car allowance.—Write, stating age, experience, etc., and area thoroughly covered. Replies treated in strictest confidence.—Managing Director, Box No. 1367, Electrical Times. (F 41)

SENIOR AND JUNIOR ELECTRICAL DESIGNERS experienced in all classes of a.c. and d.c. dynamo electric machines from 5 to 5,000 h.p./kW, 5-day week. Superannuation scheme in operation.—Applications, stating age, experience and salary expected to Personnel Manager, Lancashire Dynamo and Crypto, Ltd., Trafford Park. (F 151)

TECHNICAL WRITER required by large electrical manufacturing concern in London. Experience of electric lamps and lighting equipment an advantage.—Reply, stating age, experience, and technical qualifications, to Box No. 1427, Electrical Times. (F 190)

VICKERS ARMSTRONGS, LTD., Weybridge, invite applications for the post of ELECTRONICS ENGINEER, to take part in electronic side of special projects. Write, stating experience and qualifications, to: Employment Manager, Weybridge Works. (F 67)

VICKERS ARMSTRONGS, LTD., Weybridge, invite applications for the post of PROJECT ENGINEER, to work on certain special projects. Qualifications required for this post include experience of control methods and knowledge of electronics and instruments.—Write, stating experience and qualifications, to Employment Manager, Weybridge Works. (F 68)

WORKS SUPERINTENDENT required for transformer works manufacturing up to 5,000 kVA capacity units. Rapidly developing organisation offers first-class prospects to man having energy and initiative. Good works knowledge necessary, preferably with previous transformer experience.—Box No. 1421, Electrical Times. (F 172)

APPOINTMENTS WANTED

B.E.A. STORES OFFICER (30), experienced storekeeper, stock control, purchasing and selling, seeks position in a private concern. Willing to accept anything with future prospects.—Box No. 1423, Electrical Times. (F 188)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co., Ltd., St. Ermin's (West Side), Caxton Street, London S.W. Phone: WHItehall 9621/2/3. (A 3)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22/26 Britannia Walk, London N.1. (A 13)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 18)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling.—Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, 3,000 amp. or larger 6 to 10 V PLATING GENERATOR. 40 amp per sq ft of area to be plated.—Box No. 1385, Electrical Times. (F 91)

MANUFACTURERS, WHOLESALERS, RETAILERS

CLEAR YOUR SURPLUS STOCKS

We are eager buyers of surplus, redundant, liquidation and clearance stocks

CASH WAITING

Write giving full particulars to:—

MESSRS. S. MASS

9A STAFFORD ST., LIVERPOOL 3

(F 181p)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (D 326)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

BUSINESS OPPORTUNITIES

DEEP DRAWING AND GENERAL METAL PRESSING. Would consider buying existing small production unit with retention of interest by present management. Alternatively would set up suitable person. Must have up-to-date knowledge and actual experience of deep drawing in copper and steel.

Communicate, in first instance, with F. L. Best, A.M.I.E.E., Felix Works, Felixstowe, Suffolk. (F 162)

FOR SALE

DOMESTIC APPLIANCES

G.B.M. IMMERSION HEATERS, all lengths 12 in. to 42 in., 2 kW and 3 kW, standard voltages. Also 4 kW (non-taxable), all sizes. Satchwell thermostatic control. Guaranteed two years. Immediate delivery. For illustrated brochure and trade terms write direct to manufacturers.—G.B.M. (Electrical) Birmingham Ltd., 439 Moseley Rd., Birmingham 12. Phone: Calthorpe 2654. (F 178)

IMMERSION HEATERS. Grubb 2 kW and 3 kW standard voltages, all lengths, 12 in. to 36 in. Also 4 kW (non-taxable), 18 in. to 36 in. Fully guaranteed and immediate delivery. For illustrated brochure, latest lists and trade terms write distributors, John Owner and Co., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

AUCTION SALE

A Nationally Advertised Auction Sale of Manufacturers, Wholesalers and Dealers Surplus Stocks, will be held in the

BINGLEY HALL, BIRMINGHAM
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1,500 Lots include a large quantity of Radio, Electrical and ex-Government Stock

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Auctioneers to the Sale :

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BINGLEY HALL, BIRMINGHAM

(F 113)

CABLES & WIRE

PAPER INSULATED ARMOURED CABLES to BSS 480/1942. Considerable stocks available.—Cable Jointers, Ltd., 49 Avenue Road, W.3. Acorn 4831/2. (E 489)

PAPER INSULATED LEAD COVERED AND ARMOURED POWER CABLE to B.S.S. 480/1942, 660V. New and manufactured by Johnson and Phillips, Ediswan and British Electric, etc., at the following bargain prices:—

0·15	4 core	P.I.L.C. & S.	£375 per drum
0·1	4 core	P.I.L.C. & S.	£295 ,, ,,
0·1	4 core	P.I.L.C S.W.A. & S.	£325 ,, ,,
0·04	4 core	P.I.L.C.S.W.A. & S.	£205 ,, ,,
0·0225	4 core	P.I.L.C.S.W.A. & S.	£155 ,, ,,

All drums are 500 yards each.

Write for full details to: Messrs. Lipton Products Ltd., Phoenix Works, Lamprell Street, Bow, London E.3. (E 554)

TOUGH RUBBER CABLE available, all sizes and types: non-standard lengths (25 yd. to 50 yd.). Special prices quoted for regular buyer. Must be a user. Guaranteed strictly to B.S.S.7.—Box No. 1363, Electrical Times. (F 39)

ENGINEERING PLANT & MATERIALS

EASTERN ELECTRICITY BOARD

Hornsey District

THE following d.c. plant and equipment is offered for sale:—

Four 300 kW Hewittic glass bulb Mercury-arc Rectifiers complete with 12-phase transformers, induction regulators and all ancillary equipment. A.C. input 6,000/6,600 V, 3-phase, 50c/s. D.C. output 490/660 V.

One 500 kW Bruce Peebles "La Cour" Motor Converter, complete with starting resistance, shunt regulator, synchronising choke, etc. A.C. input 6,000/6,600 V, 3-phase, 50 c/s. D.C. output 490/650 V.

Two 300 kW do.

One 300 kW do., with Reyrolle remote control equipment.

Also sundry l.t. d.c. Switchboards, comprising circuit breakers, instruments, heavy copper busbars, etc., mounted on polished slate panels. Inspection by appointment.—District Manager, Electricity Offices, The Broadway, Crouch End, N.8. Tel.: Mountview 8262. (F 87)

ALUMINIUM ALLOY. Special offer: 6ft. x 3ft x 24 gauge flat or corrugated sheets, £9 9s. per dozen. Also angles available. All prices, carriage paid. Delivery ex-stock.—Sawyers Manufacturing Co., Ltd., Bures, Suffolk Tel.: Bures 351/2. (B 335)

LADDERS (wooden and aluminium, all types), Trestles, Steps, Handcarts, etc., from Ramsay and Sons (Forfar) Ltd., Forfar (Tel. 172). (C 603)

POWER PLANT bought and sold. Boilers, Diesel Engines, Generating Sets, etc.—W. H. Collingbourne, A.M.I.Mech.E., 1481 Stratford Road, Birmingham 28. Tel.: Shirley 3303. (F 145)

GENERATING PLANT

ALTERNATORS from stock, 400/440 V, 3-phase, 50 c/s, with Exciters and Switchboards. 80 kVA "GEC" 1,000 r.p.m. 40 kW "ECC," 750 r.p.m. 28 kVA "Crompark," 1,500 r.p.m.—Full details, write: Thos. W. Ward Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 109)

DIESEL ALTERNATOR Sets from stock up to 100 kVA 1 and 3 phase, standard votage, details post free on request.—Thos. W. Ward Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 108)

FOR sale, nearly new CATERPILLAR D3 GENERATING SET, 15 kVA, 110 V, 1 phase, 50 c/s, 1,000 r.p.m.—W. H. Collingbourne, A.M.I.Mech. E., 1481 Stratford Road, Birmingham 28. Tel.: Shirley 3303. (F 150)

MOTOR GENERATING SETS. Built to customers' requirements of new and used plant. Many in stock at Wembley, inspection invited. Please send us your inquiries. We can help you to save time. Over a THOUSAND MACHINES ALWAYS IN STOCK.—Dynamo and Motor Repairs Ltd., Wembley Park, Middlesex. Telephone: Wembley 3121 (4 lines). Also at Phoenix Works, Belgrave Terrace, Soho Road, Birmingham. Telephone: Northern 0896. (A 2)

STEAM-DRIVEN GENERATING SETS. 700-kW geared turbo alternator set by W. H. Allen/Crompton Parkinson for 440/3/50, 4 wire, 0·8 p.f., speed 6,000/1,000 r.p.m., through reduction gear. Turbines designed for steam at 280 lb sq in., against 30 lb back pressure, superheat 50° C., steam consumption 41.7 lb per kW hr. Alternatively 200 lb sq in., 10 lb back pressure steam consumption 42 lb per kW hr., then giving max. output of 620 kW. Overhauled by makers 1948. Can be reconnected for 220/3/50.

Three 500-kW geared turbo alternator sets by W. H. Allen/Crompton Parkinson for 440/3/50, 4 wire, 0·8 p.f., speed 6,000/1,000 r.p.m., through reduction gear. Turbines designed for steam at 280 lb sq in. against 30 lb. back pressure, superheat 50° C., steam consumption 37·5 lb per kW hr. Capable of full output with steam at 200 lb sq in., 10 lb back pressure, steam consumption 37 lb per kW hr. Overhauled by makers 1948. Can be reconnected for 220/3/50.

300-kW steam-driven alternator set by Belliss and Morcom/Phoenix for 500/550 V, 545 amp, speed 375 r.p.m. Steam pressure 150/160 lb sq in., superheat 500° F.

250-kW turbo generator set by W. H. Allan/Mather and Platt, for 220/230 V, speed 6,000/650 r.p.m. through reduction gear. Steam pressure 150 lb sq in., 5 lb back pressure. With switchboard.

200-kW steam-driven generator set by Belliss and Morcom/Mavour and Coulson, for 500 V d.c., 380 r.p.m., designed for steam at 85 lb sq in. gauge pressure condensing, but can be adjusted for 160 lb gauge with 25 lb. back pressure.

187-kVA steam alternator set by Browett Lindley/Wright Bros., for 400/3/50, 4 wire, 0·8 p.f., speed 428 r.p.m., steam pressure 80 lb sq in., 100° F. superheat. With valve setting altered, will operate up to 140 lb sq in. against 15 lb back pressure, dry saturated or superheated up to 150° F.—George Cohen, Sons and Co., Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070), and Stanningley, near Leeds (Tel.: Pudsey 2241). (F 55)

1 ALTERNATOR, G.E.C. 6,500 kW 0·9 power factor 6·6 kV 3-phase 50 c/s, at 500 r.p.m. Two-bearing Alternator, complete with exciter and bedplate, together with panel.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bex. 3282. (E 573)

100 KVA MODERN OIL ENGINE ALTERNATING SET, comp. Vert. 6 cyl. Solid Injection Oil Engine on baseplate coupled to 400/230 V. 3-phase, 50 c/s, 1,000 r.p.m. Alternator. Details on request.—Thos. W. Ward Ltd., Albion Works, Sheffield. Phone 26311 (ex 347) (E 112)

LIGHTING EQUIPMENT

FLUORESCENT SHELLS.—High quality stoved troughs 14s. 9d. Hexagon battens 17s. 6d., others pro rata. Complete fittings fully guaranteed at very competitive prices.—Cowling & Holdsworth, No. 1 Factory, Romside Trading Estate, North Street, Romford 7282. (F 63)

PURLEY CHOKES AND BALLASTS. Silent operation, excellent performance, efficient, long life, vacuum impregnated, quick delivery. Low price (e.g. Purley Queen, 80 watts, 14/6 each, less quantity and cash discounts). Quotations for export.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey (E 343)

40 WATT FLUORESCENT CHOKES, 16/6 each. Two-way METAL-CLAD SPLITTERS, 5/- each. 4kW IMMERSION HEATERS with Satchwell thermostat 26 in. long, £6 each. 8 Mfd. CAPACITORS, 10/- each. 15 Amp PORCELAIN FUSES, 9/- dozen. GALV. CHAIN for Fluorescent fittings, 4/- dozen yd. Post and packing extra. Cash with order.—Winco Industries, 17 Stretford Road, Manchester 15. Tel.: Moss Side 1364. (F 161)

MOTORS & STARTERS

A. A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS & SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.

STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC

Any voltage, new, short delivery, all types of revolving electrical power.

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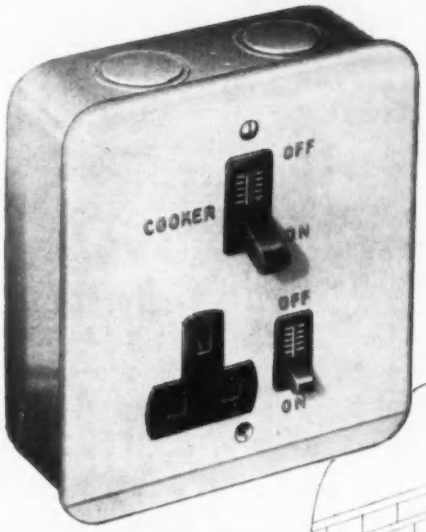

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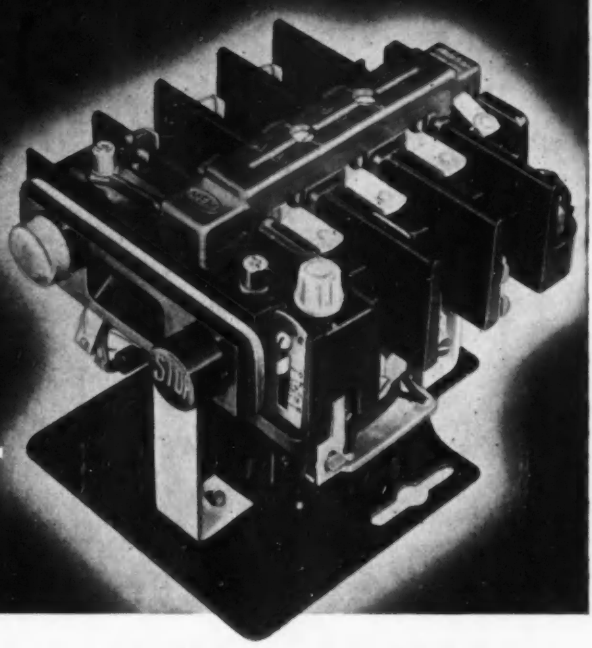

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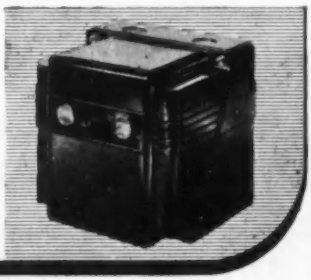

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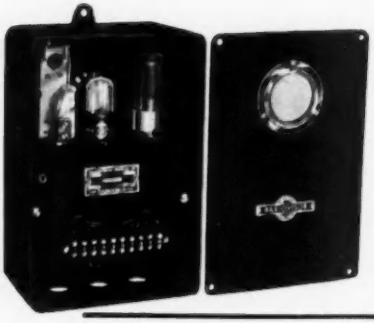

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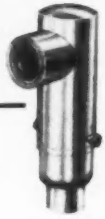

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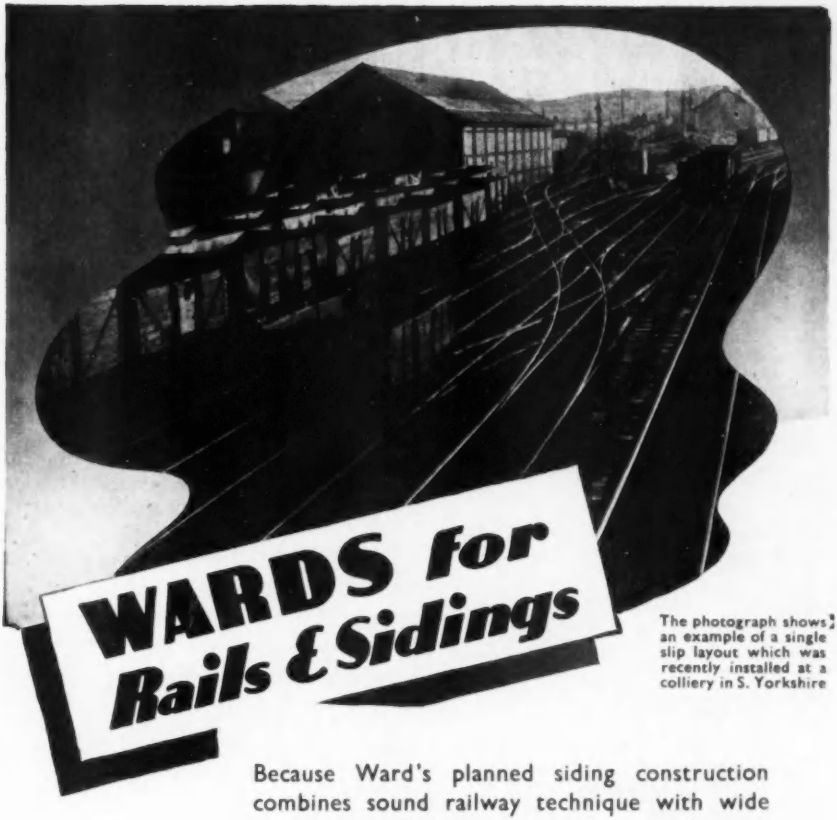

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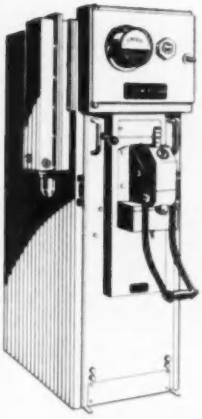

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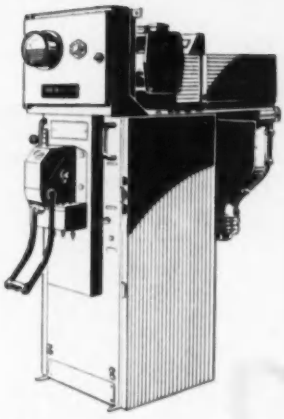

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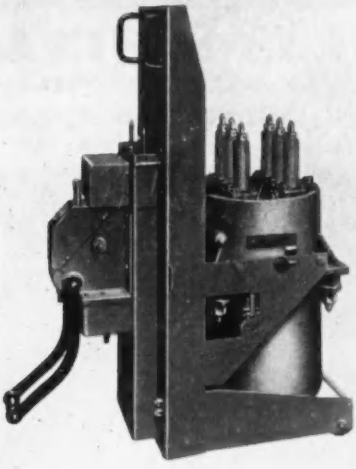

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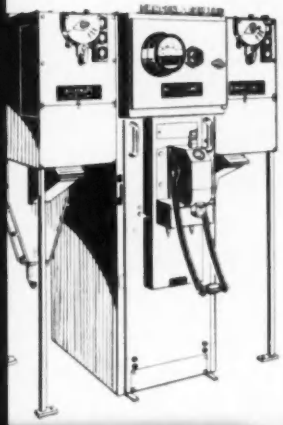

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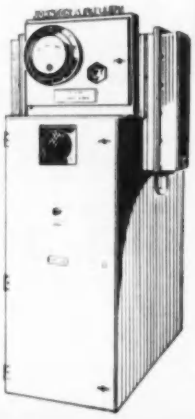

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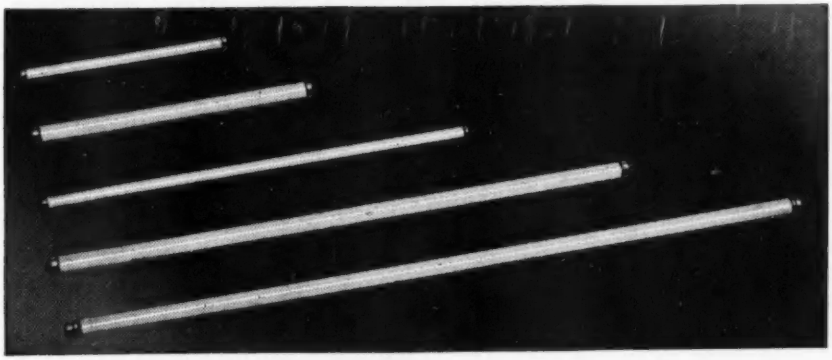

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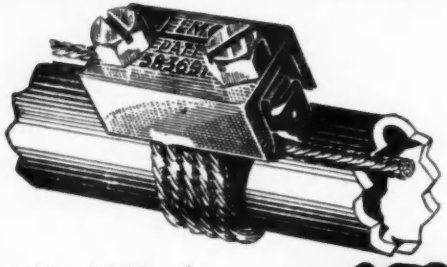

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The "Elmo" Earthing Clip is of robust construction, having larger surface than any other. Impossible for wire to pull out, always under tension, therefore the perfect earth and a permanent safeguard. Obtainable through all leading wholesalers.

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Suitable for use under extreme conditions of a dirty, highly contaminated atmosphere for energising vibrating screens, magnetic separators, chucks and magnets.

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WATERTIGHT SWITCHES. PLUGS AND SOCKETS. SWITCH-PLUGS. CABLE COUPLINGS, ETC.
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Standard type (as illus.). "Secret" type operated by key also available.

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Accurately machined. Insulation is of best quality ebonite.

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Precision casting in Zinc base alloy. Fitted with screwed locking rings.

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The most modern Centrifugal Pump

Note these Features . . .
Which mean a superior performance over a longer life

No shaft wear
Separable liquid end
Only one stuffing box
Suction pressure on stuffing box
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. . . and all the outstanding advantages of the Monobloc construction . . .

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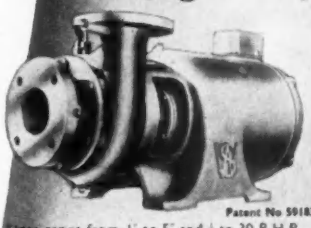

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Sizes range from 1" to 5" and ¼ to 30 B.H.P.
Capacities up to 1200 G.P.M.
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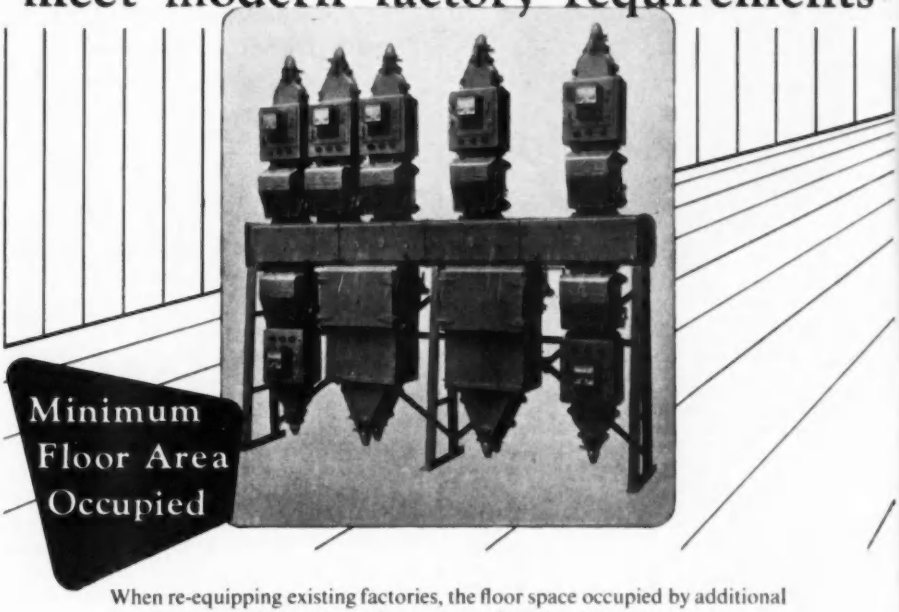
'ENGLISH ELECTRIC'

Combination

Fuse-Switch Boards

meet modern factory requirements



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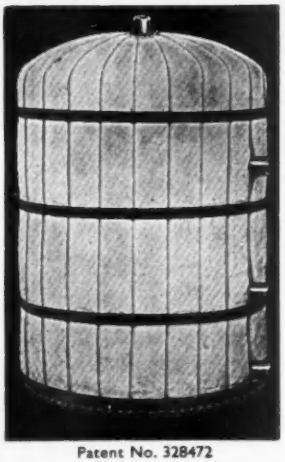

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Made in sections. Connecting pipes offer no difficulty. **EETO** jackets considerably increase hot water supply with less fuel.

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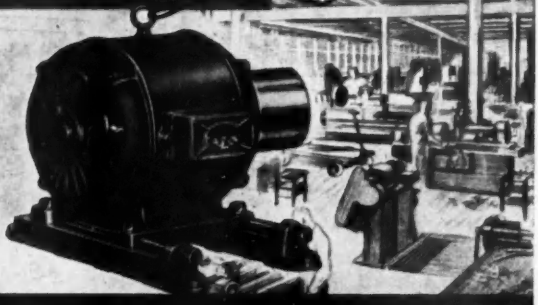

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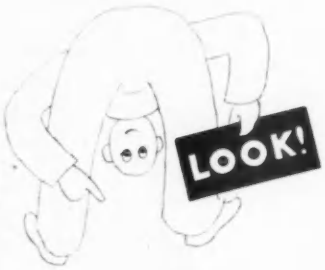

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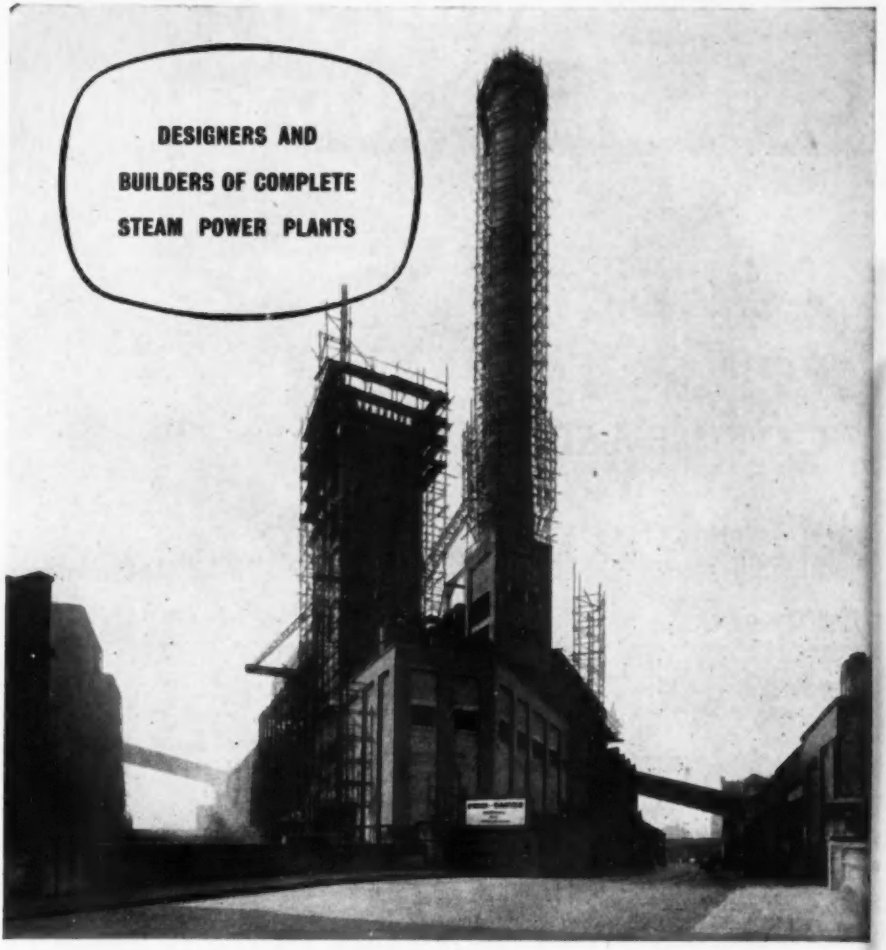

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Selenium Rectifiers

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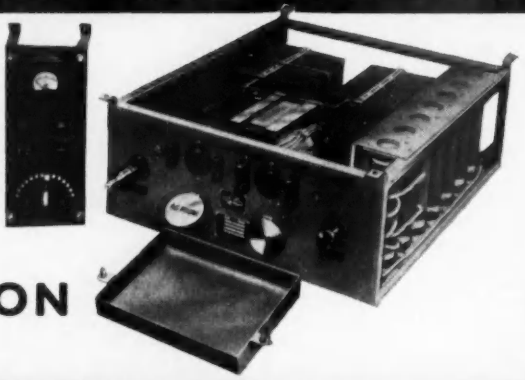

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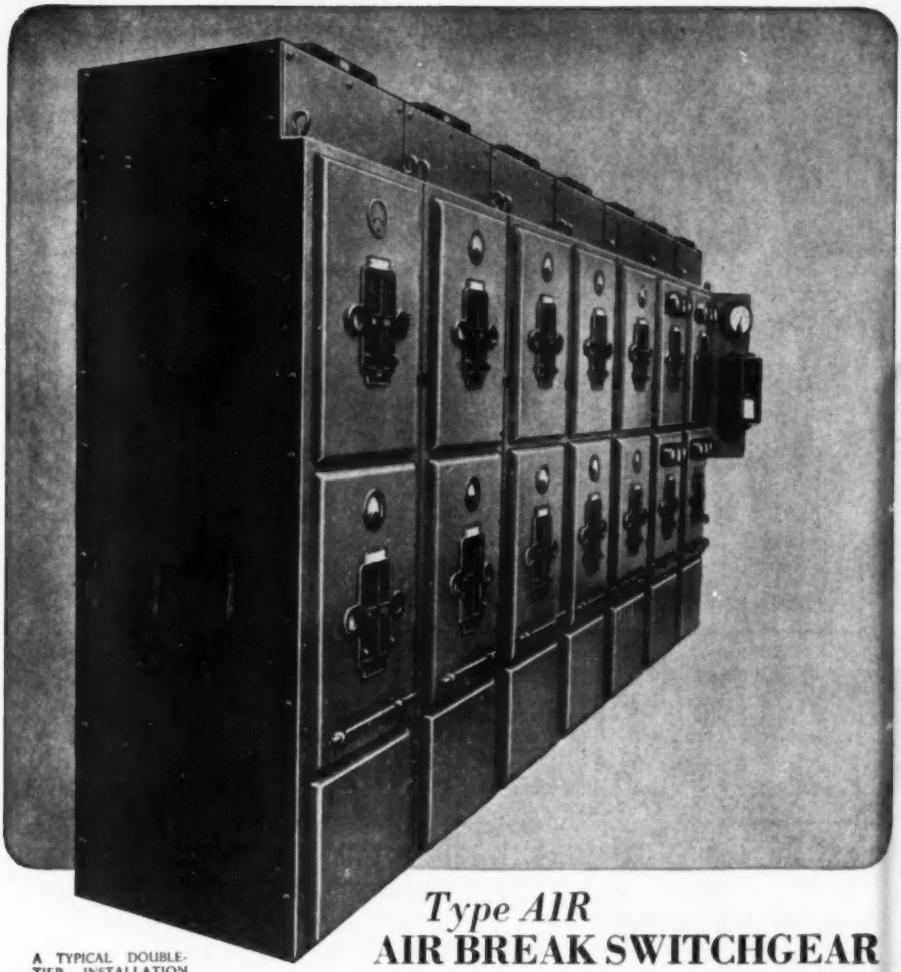

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600, 800 and 1600-amp circuit breakers now available in DOUBLE tier arrangement • 2400 and 4000-amp circuit breakers in SINGLE tier • Breaking capacity up to 36-kA r.m.s. symmetrical • For heavy duty installations in industrial works and for power station auxiliaries • Completely interlocked draw-out breakers, hand or solenoid operated.

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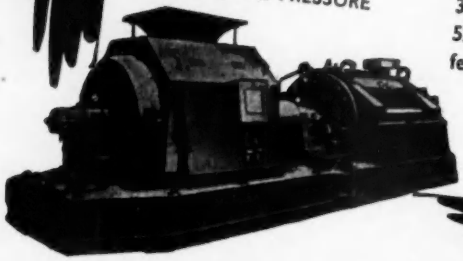

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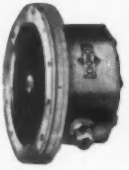

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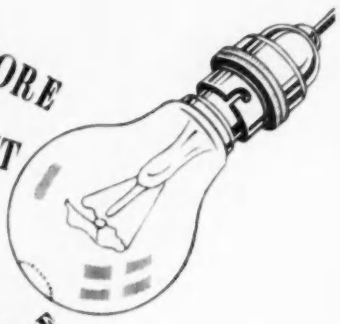

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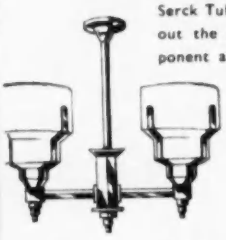

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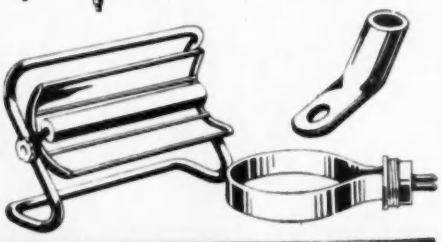

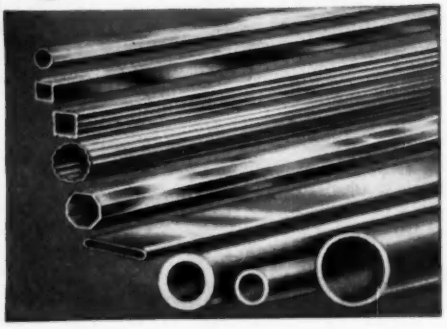

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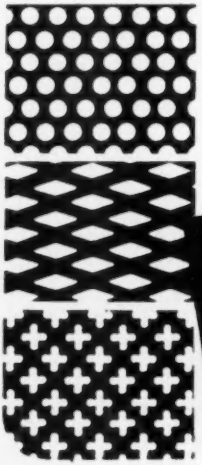

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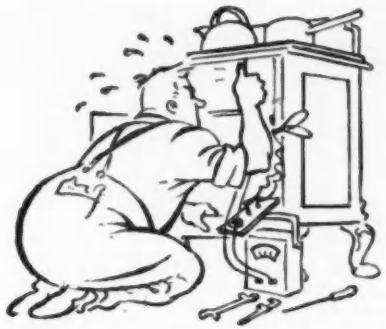

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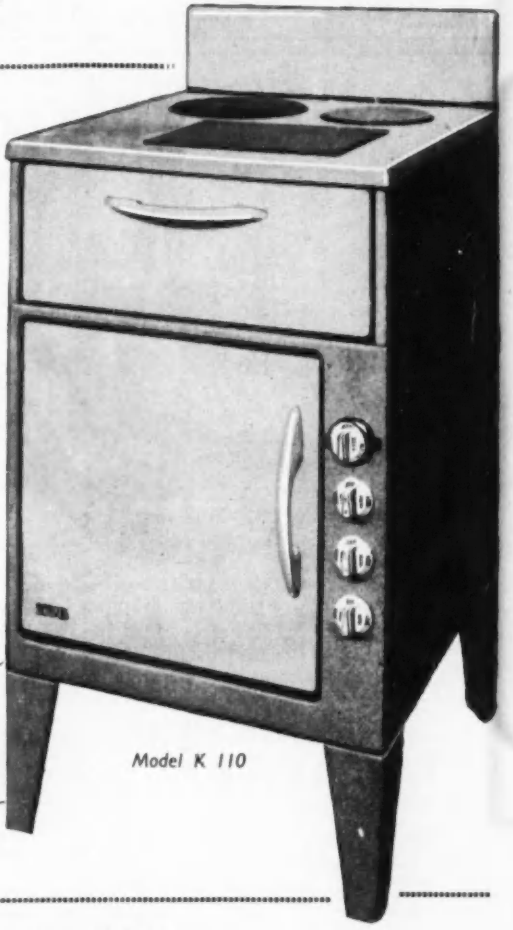

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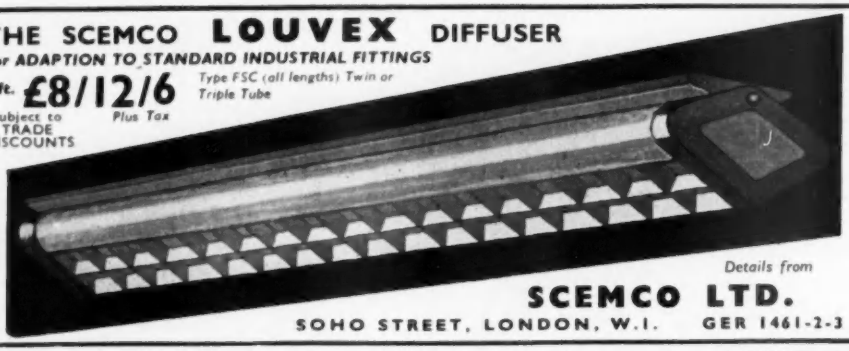

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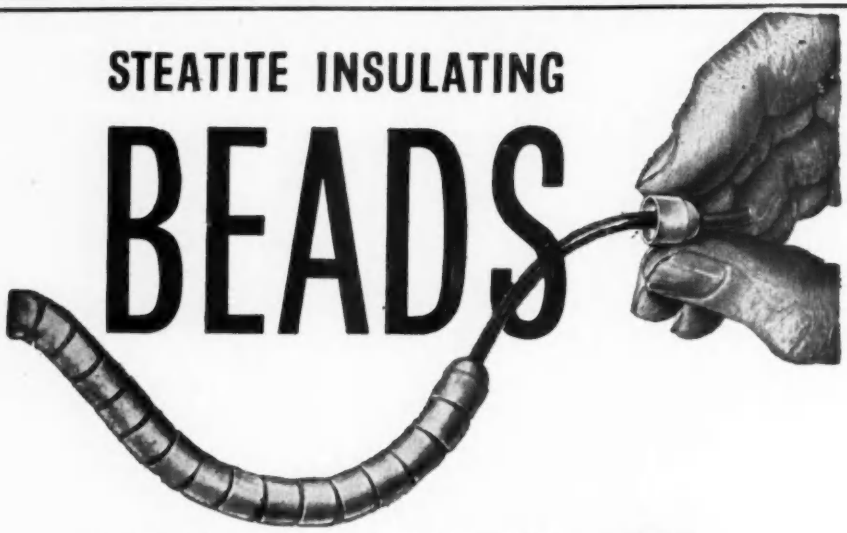

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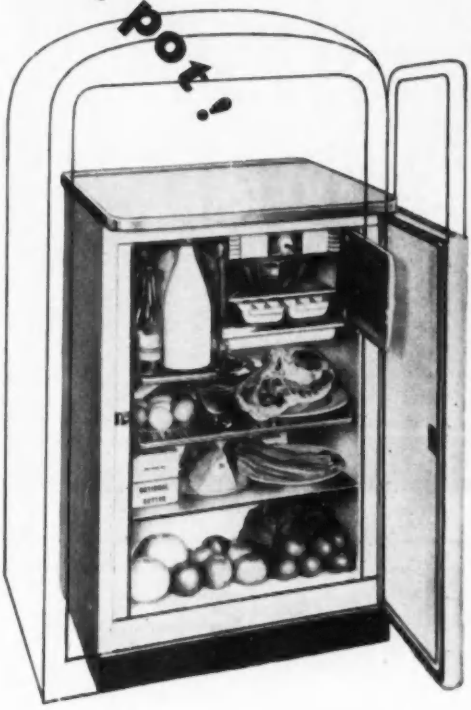

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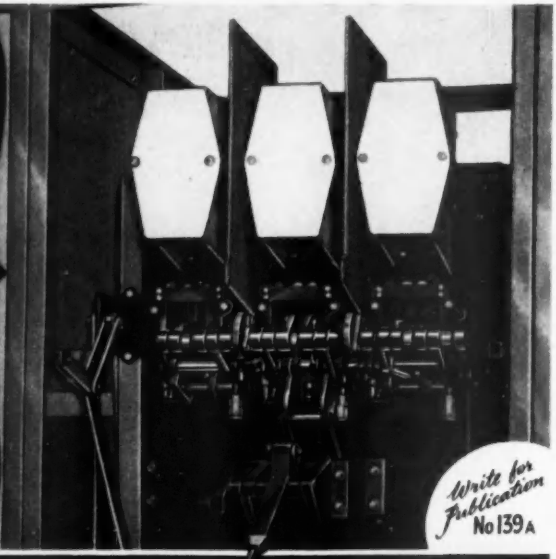

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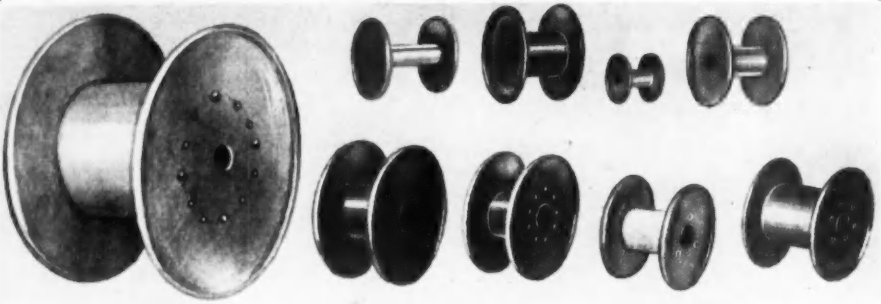

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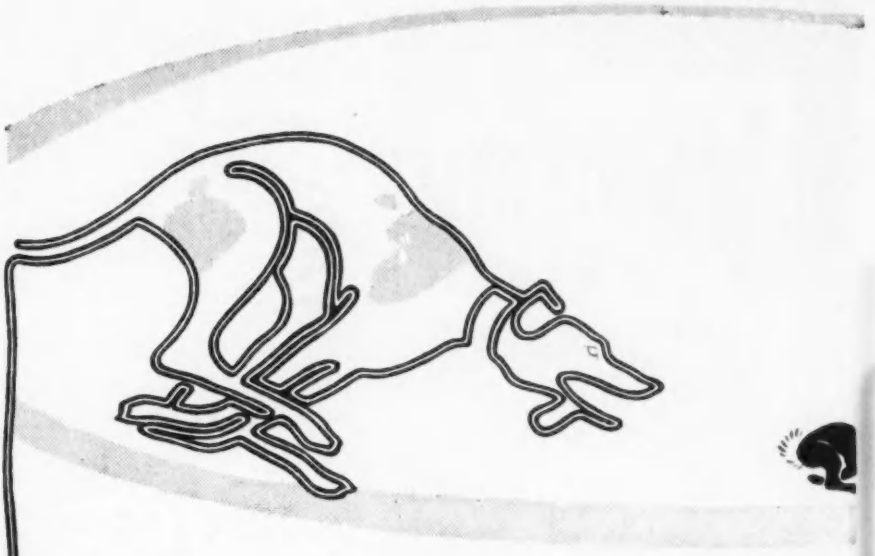

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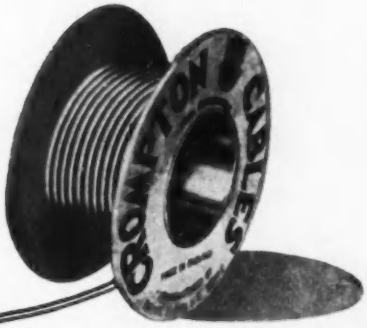

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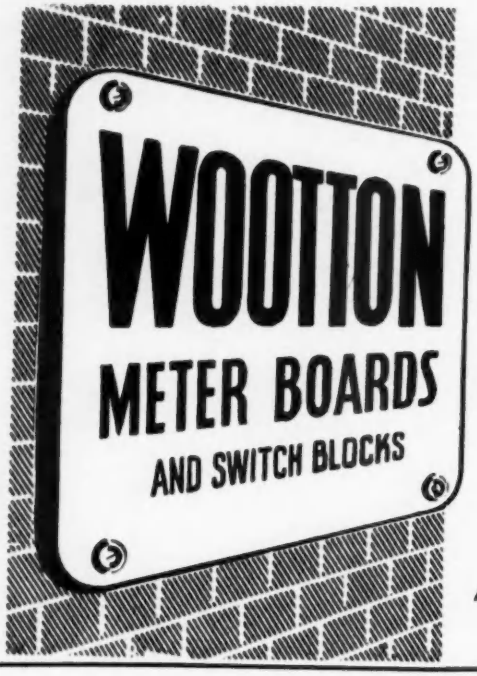

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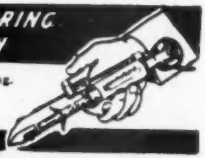

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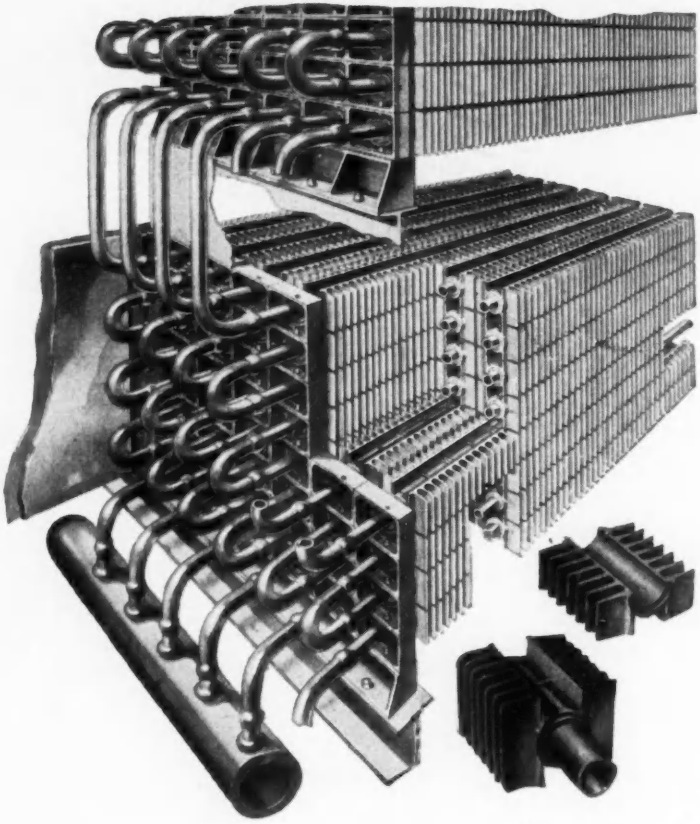

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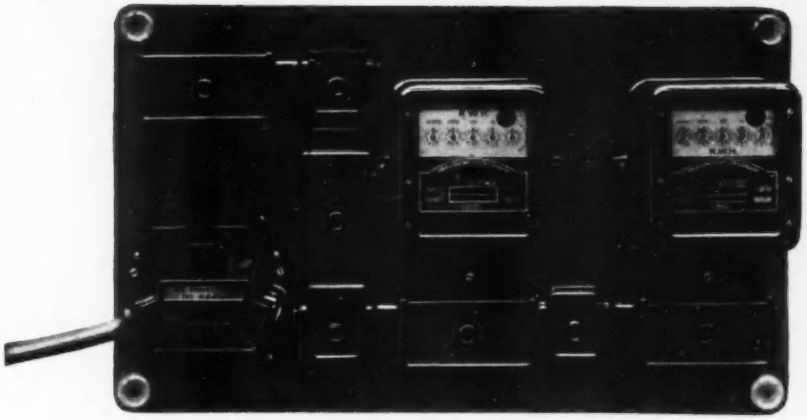

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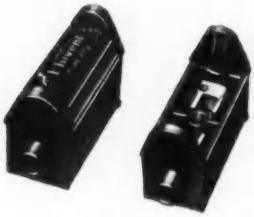

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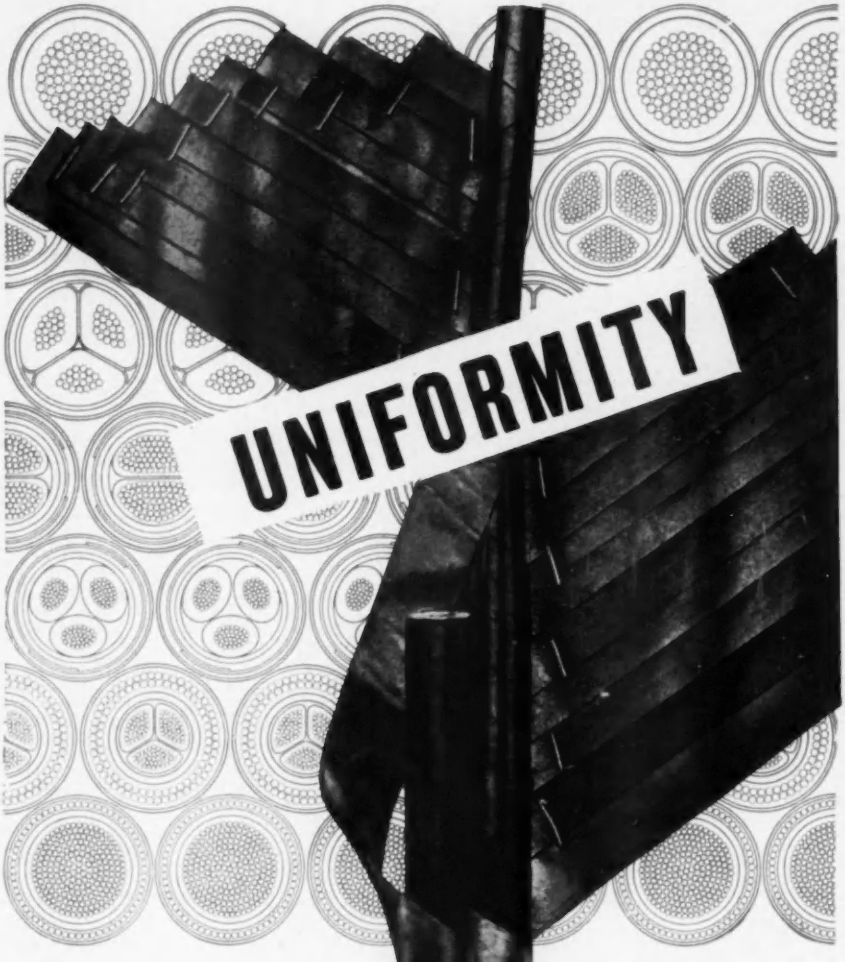

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